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Notes and Comments

A Lesson from the Gas Industry

WE commend to those who profess to desire a single organisation for the chemical profession and industry in this country a study of a passage in the presidential address which Mr. F. P. Tarratt, of Newcastle-upon-Tyne, delivered at the 71st annual general meeting of the Institution of Gas Engineers in London last week. Mr. Tarratt was at the head of a delegation of gas engineers and other representatives of the British gas industry which visited Canada and the United States last autumn. The members of the delegation made a first-hand study of the organisation of the gas industry in the United States—a unified American Gas Association, similar in constitution and objects to the American Chemical Society, in that it embraces the whole industry under one constitution, complete with its own journal.

Contrary to what might have been expected, the delegation was not convinced that the merging of the four British organisations—the Institution, National Gas Council, British Commercial Gas Association and Society of British Gas Industries—into one similar organisation would be advantageous. This is no reflection on American gas men or their association, the essential usefulness and strength of which cannot be too strongly emphasised. The historical and economic development of the American gas industry, however, has been entirely different from that of the British gas industry and no useful analogy presents itself in the American Gas Association and the four British gas organisations which, like the British constitution, are illogical in theory but extremely effective in practice. There is, however, a very close analogy between the gas industry and the chemical industry, and while there is much that we might learn from the United States we are disposed to apply the views expressed by Mr. Tarratt with equal force to the chemical industry.

Personal Contact

CLOSE personal contact exists in the separate British gas organisations, just as in the case of the separate chemical organisations, and any shortcomings in their work would not necessarily be remedied by what Mr. Tarratt describes as "constitution mongering." Indeed, in the gas industry the remedy has already largely been found in the recently constituted joint co-ordinating committee which, equally representative of the Institution of Gas Engineers, the National Gas Council and the British Commercial Gas Association,

has done much to co-ordinate the work of the separate organisations. Formed particularly to discuss broad matters of policy, it is hoped that the joint co-ordinating committee will provide a lead on many important problems by communicating its views to those responsible for the conduct of gas undertakings.

Two national conferences were called last year, as a result of which it was decided that the work to be done justified the joint annual subscription to the central fund of the three organisations being increased to ten shillings per million cu. ft. of gas sold. The joint co-ordinating committee has established a technical sub-committee representative of the recently formed industrial gas development centres. Until the separate chemical organisations can come together and set up some such simple machinery for the co-ordination of their varied interests no real progress will be made towards that unification for which some of the societies are said to be clamouring. The sooner they find common ground for co-ordination of interests the sooner they will find that complete unification on the American plan is impracticable in this country.

The Forty-Hour Week

THE forty-hour working week continues to bulk large in the attention of Governments and those who work. The British Government "is of the opinion that the adoption of a convention likely to prove effective is impracticable." In view of the differing conditions—standards of living, work performed per man, amount of machinery used, quality of labour, education of the workers, etc.—in the several parts of the earth where such a convention must of necessity be applied, the probability that the official view is correct is high. All through the industrial era in which we live, all through the years during which the use of machinery has taken the place of manual labour, hours of work have been decreasing and standards of living have been improving. No one to-day would suggest reversing the process; there is no reason why it should stop.

We can produce more goods of all sorts than we could fifty years ago; each year adds to our productive capacity; why then should we not improve our standard of living? The only reason is because there are in the world "cheap living" nations who compete with us and who can make many of the things we make much cheaper. An increase in the standard of living throughout the world is needed, not a decrease in that

of the white nations. Any decrease in the existing standards must inevitably further curtail production and intensify our present woes. Exactly the same arguments apply to hours of work. The increasing use of machinery leaves us more leisure, or alternatively enables us to make more goods. Man must work to make the goods he needs; and for no other purpose. It may be true that by no hitherto discovered convention can we further increase the standard of living, nor can we decrease the hours of work without grave damage to Britain (or Germany, or France, or Italy, or the United States, or anyone else) as a nation. But one or both of these reforms are already overdue and it must be the task of the statesmen of the world to discover means whereby they can be effected, however much the politicians declare that "a convention likely to be effective is impracticable."

The Industrialist's Opportunity

WHILST statesmen are grappling with the major problem cannot the industrialist do something in a smaller way? The standard of living he cannot touch save by the probably impracticable way of increasing wages. Hours of work, however, are more elastic and it is by no means certain that reduction of working hours proportionately or even necessarily in any degree increases production costs. Much depends on circumstances. For a works operating for 24 hours a day, such as a coke oven or blast furnace or sulphuric acid plant, to change three 8-hour shifts into four of six hours must mean proportionate increase in costs unless the men can do more work in the shorter time because they become less fatigued during the last two hours. On the other hand, we at Bouverie House have found no extra cost and much of advantage from working for five days a week instead of five and a half days. It has been argued that the gradual adoption of the two shift system on an extensive scale is probably the best solution of the 40-hour week problem; it has further been suggested that it would be possible to pay the workers the same wages as they previously received owing to the reduction of overhead costs. These costs frequently exceed the direct labour costs and as they are but little affected by the time the plant is running the saving would be very substantial if this were utilised for 80 hours a week instead of the previous 48 hours.

Even if we can find how to distribute goods to the limit of our capacity to manufacture them, a saturation limit must be reached ultimately and with the rapid and continuing increase in the productivity of labour the average working week will gradually fall, not only to 40 hours, but to much less. Extensive adoption of the shift system will then become necessary. The advance in the productivity of mankind renders it essential to solve the dual problems of permitting increased consumption per individual and of shorter working hours before true and universal prosperity can return to the world.

Diamond Jubilee of Margarine

SIXTY years have passed since the manufacture of margarine was developed on an industrial scale, and the world production of this "edible substance resembling butter," as the dictionaries kindly describe it,

exceeded a million tons last year. The English production in 1915 was estimated at 240,000 tons; to-day, in spite of the low prices ruling for butter and lard, British housewives are spending about £175,000 per week on margarine. The diamond jubilee of margarine manufacture was celebrated last week at the Purfleet works of Van den Bergh and Jurgens, when a tablet to the inventor, M. Mège Mouriés, was unveiled by the great grandsons of the first manufacturers, Mr. J. P. Van den Bergh and Mr. Franz Jurgens. The invention of margarine was not only a romance of industries but a romance of two families. When the Germans were advancing on Paris during the Franco-Prussian war the supply of foods in the capital became more and more difficult. Napoleon III offered a prize for the discovery "of an article as nutritious, as stable, and as palatable as butter." A French chemist, M. Mège Mouriés, after many experiments, discovered that milk and butter originated from the actual fat in the body of the cow, and he succeeded in producing from animal fat a product which, though very different from the product of to-day, was its forerunner, and won the prize. The great-grandfather of Mr. Franz Jurgens, then living at Oss, a small village in Holland, went to Paris to learn how to make this new product, called margarine, and on his return started manufacturing it in a small way at Oss. Mr. J. P. Van den Bergh's grandfather, who lived near, was a butter merchant, and he also erected a small plant, and later sent his eldest son to England, where he started importing small quantities of margarine.

For many years the Dutch, whose factories were established in rich farm lands with large quantities of easily accessible milk, made the finest margarine. Later factories were started in England, and for a number of years the requirements of this country have been manufactured in England. In the early days the raw material were limited, but vast improvements in the methods of refining resulted in the use of such vegetable oils as groundnut, sesame and sunflower, which when highly refined are tasteless, of a good colour, and highly nutritious. After long research it was discovered how to introduce vitamins A and D, and last year these sunshine vitamins were introduced.

The Discoverer of Vitamins

THE Council of the Royal Society of Arts has awarded the Society's Albert Medal for 1934 to Sir Frederick Gowland Hopkins, president of the Royal Society, "for his researches in Biochemistry and the Constituents of Foods." Sir Frederick has been Professor of Biochemistry in the University of Cambridge since 1914, and Sir William Dunn Professor since 1921. He received the Nobel Prize in 1929, the Royal Medal of the Royal Society in 1918, and the Copley Medal in 1926. He has been the foremost leader in biochemical research for twenty-five years, and his name is intimately associated with one of the most important discoveries of the century, which is summed up in the word "vitamins." The Society's Albert Medal was instituted in 1862 as a memorial to the Prince Consort, for eighteen years president of the Society, and is awarded annually for "distinguished merit in promoting arts, manufactures or commerce." The first medal was awarded to Sir Rowland Hill.

The Chemical Society

Visit to the Chemical Research Laboratory, Teddington

ABOUT 260 Fellows of the Chemical Society accepted the invitation of their president (Professor G. T. Morgan) to hold an ordinary scientific meeting at the Teddington chemical laboratories of the Department of Scientific and Industrial Research on Thursday, June 7. The proceedings opened with the formal admittance of fourteen Fellows, twelve being members of the laboratory staff, and a ballot of candidates for admission resulted in the election of nineteen new Fellows. Three scientific papers were then read dealing with various aspects of recent researches on the synthesis of organic substances under pressure.

Catalytic Syntheses with Carbon Monoxide and Hydrogen under Pressure

Mr. R. Taylor gave an account of his experiments on condensations between carbon monoxide and hydrogen, at 400° and under 200 to 250 atmospheres pressure in the presence of various catalysts with a rate of circulation of about 80 litres of compressed gas per hour. In these researches special attention has been directed to the production of alcohols other than methyl alcohol (methanol) and with this end in view a study has been made of catalysts which modify the simpler reactions induced by a basic zinc chromate catalyst. An optimum conversion to ethyl alcohol obtained with catalyst containing copper, cobalt and manganese gave percentage conversions of carbon monoxide into 17 per cent. methyl, 22 per cent. ethyl and 11 per cent. higher alcohols, but there was also a large concurrent production of methane. Cobalt introduced into a contact mass as sulphide improved the yield of ethyl alcohol but the proportion of methane was still considerable. The alcohol fractions from the copper-manganese oxide and cobalt sulphide catalyst boiling above 83° were dehydrated by distillation with carbon tetrachloride and then fractionated systematically when *n*-butyl, *n*-amyl, *n*-hexyl and *n*-heptyl alcohols were separated. Such unbranched primary alcohols amounted to more than 90 per cent. of the mixture which in addition contained *iso*-butyl alcohol, 2-methylbutanol and 2-methylpentanol. The proportion of branched chain alcohols is increased by the use of a manganese-chromium oxide catalyst rendered alkaline with rubidia.

So far the ethyl alcohol produced corresponds to two-thirds of the carbon atoms which unite to form alcohols higher than methanol and this fact renders hopeful the possibility of building up alcohols with a predetermined number of carbon atoms. Higher alcohols may be assumed to be produced by an intermediate formation of aldehydes which undergo aldolisation when the resulting aldol (hydroxyaldehyde) loses water to form an unsaturated aldehyde. The latter by hydrogenation passes into a saturated aldehyde which either gives an aldol with a greater number of carbon atoms or becomes hydrogenated to the corresponding alcohol.

These processes may be illustrated by the coupling of acetaldehyde and propionaldehyde. If the former furnishes the active hydrogen in aldolisation the final hydrogenation product is *n*-amyl alcohol. If the latter aldehyde provides the active hydrogen, this condensation leads to 2-methylbutanol. Some catalysts favour the formation of branched chain alcohols; others induce the production of alcohols of the normal series.

Interaction of Methyl Alcohol and Carbon Monoxide: Synthesis of Acetic Acid

Dr. D. V. N. Hardy referred first to an alternative mechanism for the ascent of the homologous series in which carbon monoxide was added directly to alcohols with production of acids which may then be reduced successively to aldehydes and alcohols. In his experiments, methyl alcohol and carbon monoxide had been condensed together at 320 to 340° under a pressure of 150 atmospheres in presence of phosphoric acid. The gas was circulated at a rate of two cubic metres per hour and 120 grams of methyl alcohol were vapourised into the system during the same period. Acetic acid and methyl acetate were obtained together with an oily

layer containing high boiling hydrocarbons from which hexamethylbenzene was isolated. When a small amount of copper phosphate was added to the phosphoric acid this oily layer no longer appeared and the yields of acetic acid and its methyl ester were improved considerably. The ratio of free to combined acetic acid varied considerably with alterations in experimental conditions. Favourable results were obtained on using 80 per cent. methyl alcohol and a catalyst consisting of 87 per cent. phosphoric acid containing 2 per cent. cupric phosphate. In the circulatory plant employed optimum conditions gave an output of 1.6 kilos of total acetic acid in 14 hours.

Condensations and Aminations under Pressure

Dr. D. D. Pratt began his remarks under this heading by referring to the laboratory equipment of autoclaves ranging in capacity from 50 c.c. to 10 litres and capable of withstanding pressures up to 200 atmospheres at 450°. These pressure vessels have been of service to practically all research sections of the laboratory in the preparation of starting materials and intermediates. The upper limits of temperature and pressure were reached only in experiments on the hydrogenation of tar products but pressures of 50 to 100 atmospheres have been quite usual in (1) the introduction of carboxyl groups into aromatic compounds by direct condensation with carbon dioxide and (2) the amination of hydroxylic compounds by the use of ammonium chloride.

Benzene and its homologues furnish carboxylic acids when condensed with carbon dioxide at 100° under 50 atmospheres pressure in presence of aluminium chloride. Benzophenone and its homologues arise as by-products. Diphenyl gives *p*-xenylcarboxylic acid and dioxenyl ketone. With phenols, carbon dioxide condenses to yield *o*-hydroxycarboxylic acids and hydroxybenzophenones. Phenol itself is converted into salicylic acid, 2:4'- and 4:4'- dihydroxybenzophenones with smaller amounts of aurin colouring matters. Aniline and carbon dioxide with aluminium chloride as catalyst give diphenylurea. When similarly treated dimethylaniline furnishes *p*-dimethylaminobenzoic acid, *p*:*p'*-tetramethyldiaminobenzophenone (Michler's ketone) and its reduction product, tetramethyldiaminodiphenylmethane. Ethylaniline gave rise to ethyldiphenylurea and *p*:*p'*-diethyldiaminobenzophenone, an isomeride of Michler's ketone.

At 200° aqueous ammonia reacts with resorcinol and orcinol to yield respectively *m*-aminophenol and 5-amino-*m*-cresol. Ethylamine and resorcinol furnish the technically important *m*-ethylaminophenol. At 300° ammonium chloride gives a high conversion of ethyl alcohol into a mixture of mono-, di- and tri-ethylamines. These bases are readily separated from one another by fractional distillation through a Dufton column. At 320 to 350° phenols are converted by ammonium chloride into a mixture of primary and secondary amines and the reaction is particularly successful with *m*-cresol and with symmetrical xylenol, so that this mode of amination becomes of technical significance since these two phenols are predominant constituents of coal tar phenols whereas the resulting bases, *m*-toluidine and *sym*-xylidine are not readily obtained by nitration of the hydrocarbon followed by reduction of the nitro-derivative.

Comparative experiments on amination with ammonium chloride made on a large number of phenolic homologues including carvacrol and thymol indicate that the yields of primary aromatic amines are evidently influenced by the orientation of alkyl constituents in the aromatic nucleus. With ammonium chloride at 320°, 2-hydroxydiphenyl gave *o*-xenylamine whereas 2:2'-dihydroxydiphenyl was converted into carbazole.

Demonstrations and Exhibits

At the end of the meeting the visitors partook of tea and were then divided into groups of twenty in order to make an inspection of the laboratories. In his capacity as Director, Professor Morgan had arranged for exhibits and demonstrations in each of the ten research sections and these were

visited in turn under the guidance of the scientific and technical staffs. The circulatory plant for alcohol synthesis was running and the synthetic acetic acid plant was open for inspection. In the same laboratory were to be seen the 10 litre autoclave and several smaller ones mounted inside steel enclosures surrounded by stout rope explosion screens. One large scale laboratory contained two 300 atmosphere compressors, the superpressure plant with autoclave and compression pump for pressures up to 3,000 atmospheres and the furnace with accessories for hydrogenation of coal tar. The exhibits of the synthetic resin and road tar sections were displayed in this room, which also included a hydraulic press with electrically and steam heated platens for the preparation of mouldings from resinous moulding powders.

In a recently erected large scale laboratory were shown the plant for tar research, including two ether extractors, vacuum stills and refrigerators. Nearby were two stills for the extraction of germanium from coal ash.

A considerable portion of the plant required in the various research sections had been constructed in the two workshops which were open for inspection. The laboratory exhibits of research chemicals included higher alcohols with crystalline derivatives, higher phenols and complex aromatic hydrocarbons either obtained from tars or produced synthetically, several series of substances of chemotherapeutic significance, a collection of crystalline intermediates isolated in course of experiments on synthetic resins and organometalloidal deriva-

tives containing arsenic, antimony, selenium and tellurium. Experimental studies on residual affinity and co-ordination were exemplified by co-ordination compounds of platinum and the currency metals.

The laboratories devoted to studies on corrosion contained stills for conductivity water, thermostats for experiments on metals submerged in oxygenated solutions, and apparatus for examining the aerial corrosion of various metallic surfaces. In the section dealing with water pollution there were shown samples of base-exchange materials prepared from English clays. Special reference should be made to recent work in dental research on the production of non-metallic substitutes for dental vulcanite, the standardisation of dental plaster of Paris and the testing of dental materials such as vulcanite, plasters, synthetic resins and dental cements. Interesting exhibits were also shown in the microbiology section, including a study of microbiological methods of preparing organic compounds such as dihydroxyacetone, the protection of fabrics against microbiological decay, an investigation of sulphur bacteria and an inquiry into the actinomycetes producing an earthy taint in salmon. In the adjacent grounds were seen (1) an isolated shed containing an extensive collection of standard tars and tar products, and (2) plants for separating the resinous and crystalline constituents of tar and for extracting rhenium from molybdenite. A vote of thanks to the Director and staff was proposed by Sir Martin Forster, F.R.S., and carried by acclamation.

The Rubber Growers' Association

A Simple, Flexible and Workable Regulation Scheme

PRESIDING at the annual meeting of the Rubber Growers' Association, held at Southern House, London, on June 7, Mr. W. J. Gallagher said the rubber regulation scheme recently adopted was simple, flexible and workable. Each country was free to choose its own methods of preventing its exports exceeding the permissible limit. The officials in the producing countries had a deserved reputation for efficiency, and in due course the regulation scheme would function effectively. The interests of those concerned—producers, manufacturers, and consumers, would be least disturbed if it was gradually and steadily applied. The essential object of the regulation was to achieve and maintain such a price-level as would make the production of rubber as profitable and as attractive to capital and to enterprise as any other class of business. The return on the capital invested in the rubber-growing business must be in due relation to its hazardous character. The costs of recent years had not been economic costs, and in few, if any, instances had provision been made for obsolescence of plantations, which is no negligible item.

An Economic Price Level

There were many factors to be considered in adjudging an economic price-level. No producer would like to see a price prevailing that was above the economic price-level, as the higher the price the more easily could substitutes establish themselves. The price-level might affect consumption too, though not so much as was usually believed. Such substitutes as could in the long run hold their own at the economic price for crude rubber were economically justified, and producers must be prepared to accept them as successful competitors. Any use for rubber which could be maintained only at an uneconomic price must ultimately disappear.

There was a belief among some producers and perhaps other people, which had probably arisen by wrong inference from or misinterpretation of the statements of one or two manufacturers, that manufacturers desired to get rubber at as low a price as possible. Such a belief was entirely ungrounded. The manufacturer could not, it was true, be indifferent to price; certainly not indifferent to immoderate variations in price. Manufacturers did not want unduly high prices that would give an advantage to competitive products. Such a reduction of consumption would be equally to their disadvantage. In his opinion the price that would be adequate for efficient producers would not be so high as to endanger

consumption in any way. Manufacturers particularly desired a reasonably steady price. The International Rubber Regulation Committee had powers which, if exercised, should enable it to stabilise prices, or at any rate to prevent immoderate fluctuations. The variations in price had been more due to erratic demand than to variations in supply, and presumably due to irregularity in purchasing pressure by the manufacturers themselves. Perhaps the panel of manufacturers envisaged in the regulation might be able to arrange to smooth out manufacturers' demand.

Research and Propaganda

Every producer wished to sell all he could produce at a profitable price; in other words, none of them desired to retain a day longer than necessary that part of the regulation that limited production. They wanted to reach as soon as possible a state of affairs in which consumption would be great enough to absorb all the rubber that could be freely produced. They should try to do all they could to hasten the approach of the time when approximate equilibrium would be established. Consumption was increasing and the rate of increase could be accelerated by research and propaganda. There were two major duties before producers: (1) to defend and maintain rubber in its present applications and prevent it being replaced by other products; (2) to increase the consumption in its present uses and to find new uses. These duties could be effectively and adequately carried out only by organised research and propaganda with international support.

Research was not something exceptional. Its cost was just part of their essential and normal expenditure. No one expected any great discovery or invention that would in itself absorb rubber in quantities of the order of 100,000 tons. But many applications, each not great in itself, might be devised that would need in the aggregate considerable quantities. Rubber had certain drawbacks that limited its uses. Research would overcome these, or many of them, and strengthen the competitive position. There were situations in which the special advantages of using rubber would in time, become evident, and it would be employed in them irrespective of its possibly higher initial cost. For instance, it was likely to come to be used on roadways adjacent to schools, hospitals, and old buildings of historical importance, and in tunnels and other places where noise and vibration must be reduced to a minimum.

Some Notes on Benzol Refining at Newcastle-on-Tyne

By S. A. W. WIKNER and B. RICHARDSON

IN the acid washing process formerly used at Newcastle the crude benzol was washed as received, the customary "once-running" distillation being omitted. It is an advantage to add the strong acid in more than one wash, for the products of the earlier washes are removed and more effect is then obtained with succeeding washes. In the authors' experience, no instance of acidity or of free sulphur in the benzol has been observed over a number of years. Corrosion of the plant has occurred, but mainly in parts which can be renewed at little inconvenience and expense, while the saving is substantial. The rectifying still is fitted with a fractionating column of the ring packed type, consisting of a steel cylinder, 24 ft. by 2 ft. 8 in. diameter, lagged and packed with 1½ in. Lessing stoneware rings. The continuity is broken by grids, a space of 2 in. being left between the bottom of of each and the packing below. Working without any reflux and depending for irrigation upon the liquid which may condense in the column, a satisfactory yield of motor benzol can be obtained directly from the washed crude benzol at an average rate of 150 gal. per hour.

Examination showed that if acid washing were omitted, the benzol distilling over was, in the later fractions, yellow in colour and of indifferent odour. A more stable benzol could be obtained by eliminating a small amount of the "heavy end" or by a modified wash with strong acid of either the whole or the heavier part of the benzol. A diminished yield resulted in each case. In order to avoid this loss, more potent inhibitors were tried. The addition of 0.01 per cent. of alpha naphthol gave a satisfactory gum test, whilst a mixture of 0.03 per cent. cresol and 0.005 per cent. alpha naphthol was not only cheaper but still further improved the gum test.

Inhibition by cresol alone gave better results than had been obtained in the laboratory. Nevertheless, to obtain the maximum yield of benzol of the correct gum test, an inhibitor more powerful than cresol must be used. Catechol, therefore, which does not affect the colour of the benzol, is now mixed with the cresol. By the inhibitor process, there is an increased yield of motor benzol of about 5 per cent. The cost of acid is reduced by 80 per cent., but this is in part counterbalanced by the cost of special treatment necessary to remove excess sulphur. There is no troublesome acid tar to handle and the waste acid is clean enough to use for other purposes, while it is believed that corrosion of the distilling plant will be considerably reduced.

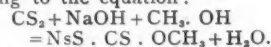
Removal of Carbon Disulphide

On turning over to this process, however, the problem of sulphur content became acute. Attention was, therefore, directed to removal of part of the carbon disulphide. The benzol contained about 0.65 per cent. total sulphur, so that it was necessary to remove 0.25 per cent. Removal of even so small a quantity by distillation could only be done by very slow fractionation. Some 10 per cent. of forerunnings required to be taken off, causing delay in working and necessitating storage for the fractions. The forerunnings could be concentrated by re-distillation, but there remained the difficulty of disposing of the final carbon disulphide fraction. Unwashed forerunnings contain appreciable quantities of both unsaturateds and paraffins boiling at and below the boiling point of carbon disulphide. Even with a good fractionating plant the concentration of CS₂ could not be much more than, say, 50 per cent. Such a product is almost unsaleable, and it was, therefore, decided that removal of CS₂ by chemical means is desirable, provided the cost is not excessive.

Much valuable work on chemical processes had already been done by the research department of the National Benzol

Co., Ltd., and this was willingly made available, only two processes appearing to be promising. The first, treatment with sodium sulphide, involved washing the benzol at a temperature of 50° C., which suggested much loss by evaporation and added fire hazard. The second method, based upon the use of alcoholic soda at ordinary temperatures, seemed more attractive and was investigated. This, the methanol-soda process, in connection with which patent applications

have been filed by the National Benzol Co., is based upon the reaction at ordinary temperatures between carbon disulphide, methyl alcohol (methanol) and caustic soda according to the equation:



Sodium methyl xanthate is formed, and on the addition of water dissolves and can be separated completely from the benzol. Before the process had been applied on a works scale,

experiments were made, the results being given in Table I.

Theoretically, 1 c.c. of methanol entering into the reaction should remove 1.6 gram of sulphur, and 1 grams of caustic soda should remove 1.6 gram of sulphur. It will be seen from Table I that in every case the action of methanol is much below the theoretical. Increasing the proportion of caustic soda decreased its efficiency, but increased that of methanol. If methanol is to be recovered, however, the efficiency of caustic soda must be kept up, otherwise the cost of recovery will be increased. Increasing the methanol did not much improve the soda efficiency, although the action seemed to take place more quickly. The presence of 10 per cent. of water was not detrimental. It should be noted that water formed in the reaction may amount to 5 per cent. of the volume of methanol.

TABLE I.

Experiment No.	Benzole shaken with	Grams Sulphur Removed			
		Per c.c. of Methanol		Per gram of NaOH	
		2 Hrs.	4 Hrs.	2 Hrs.	4 Hrs.
1	Methanol 1 per cent. (vol.)	0.40	0.49	1.0	1.22
2	NaOH 0.4 per cent. (wt./vol.)	0.27	0.27	1.35	1.35
3	Methanol 1 per cent.	0.26	0.28	1.25	1.40
4	NaOH 0.2 per cent.	0.55	0.78	0.69	0.98
5	Methanol 1 per cent.	0.57	0.78	0.71	0.98
6	NaOH 0.8 per cent.	0.18	0.24	1.00	1.30
7	As experiment 4, but kept at 35° C.	0.14	0.14	1.35	1.42
8	1.1 per cent. methanol-soda normal	0.18	0.34	0.22	0.42
	Methanol 2 per cent.				
	NaOH 0.2 per cent.				
	Methanol 0.5 per cent.				
	NaOH 0.8 per cent.				

The Methanol Soda Process

Applying the process to the works, the method as in experiment No. 3 has been adopted. To a washer charge of 2,500 gal., after carefully draining off the last water wash, 25 gal. of methanol and 50 lb. of "flake" caustic soda are added. After four hours' agitation, 50 gal. of water are run in and stirring continued for 30 minutes. The xanthate solution settles readily and is run off to a receiver. Two washes each with 25 gal. of water are then given, the washings being added to the main xanthate solution in the receiver. The reduction of sulphur content is 0.25 per cent., which is equivalent to a removal of sulphur of 0.22 gram per c.c. of methanol, and 1.08 gram per gram of caustic soda. The two small water washes following the xanthate wash are necessary, otherwise much methanol will be lost in the benzol. Also the xanthate solution requires to be diluted in order to get the best results in the recovery process adopted.

The method adopted for the recovery of methanol is based upon the fact that sodium methyl xanthate is quickly and

completely decomposed on treatment with dilute sulphuric acid. The main products of the reaction are methanol, carbon disulphide and sodium sulphate. If the solution is sufficiently dilute, and the acid is added slowly with constant mixing, there is but a slight rise of temperature. On standing, crude carbon disulphide containing dissolved sulphur settles out at the bottom as a black layer which may be run off. From the remaining liquor, methanol may be obtained by a fractional distillation. This recovered methanol is practically free from sulphur, showing that the separation of carbon disulphide is complete, and appears to be no less effective in use than fresh methanol. Emission of hydrogen sulphide during neutralisation of the xanthate complicates the recovery process. Determination of the amount liberated in the process gave some interesting results:

Freshly prepared xanthate	0.08 gm. H ₂ S per 100 c.c.
After storing for three months ..	0.98 " " " "
After storing for six months	1.90 " " " "

The amount of acid used should be just sufficient to neutralise the caustic soda originally present. This can be determined by titration. Distillation data has been noted as follows:

Charged to still (15 per cent. methanol)	140 gal.
Strong methanol obtained (97 per cent. strength) ..	20 "
Weak methanol	7 "
Ratio of influx	2.6 to 1
Consumption per gal. of methanol made—	
Steam (at 25 lb. pressure)	30 lb
Cooling water	40 gal
Time of working	5 hrs

The carbon disulphide recoverable is 50 to 60 per cent. of

the amount removed from the benzol. Washing with caustic soda and strong sulphuric acid, followed by careful fractionating, will yield rectified carbon disulphide of fair quality. Suggestions for dealing with this by-product are: (1) Disposal in crude form after washing to makers of carbon disulphide; (2) in the event of extension of the process, working up in remunerative quantities at central refineries.

Particulars of the cost of removal of sulphur from benzol by the methanol-soda process can only be tentative until longer experience of working has been gained. The cost per unit of sulphur removed is lower when the initial content of carbon disulphide in the benzol is high, the reaction proceeding more efficiently under these circumstances. Assuming a recovery of 85 per cent. of methanol, the cost of removing carbon disulphide from benzol (in pence per gal. of benzol) may be stated as in the following table:

	Sulphur Reduced from 1.0 per cent. to 0.1 per cent.	Sulphur Reduced from 0.35 per cent. to 0.1 per cent.
Chemicals, steam and labour	0.32	0.11
Interest and depreciation of plant—		
£300 at 15 per cent., 300,000 gal. per annum	0.04	0.04
Total	0.36	0.15
Cost per gal., per 0.1 per cent. sulphur removed	0.04	0.06

If by careful working a recovery of 90 per cent. of methanol can be maintained these figures will be reduced to 0.032 and 0.053 respectively. These costs, which are based upon actual results, are given with some reserve.

Boots Pure Drug Co., Ltd.

Over £2,000,000 Spent on Extensions in Four Years

LORD TRENT presided at the forty-sixth annual meeting of Boots Pure Drug Co., Ltd., at Nottingham, on June 7. In moving the adoption of the report and accounts, he said it had become fashionable in some circles to deplore the growth of large concerns and to suggest that they constituted an element of weakness to the country. The matter of reserve funds had an important bearing on this question, for it was due to the carefully husbanded reserves of the large concerns that the depression through which we had been passing was not a good deal worse than it had been. As an instance of what had been done, he quoted the action of their own company, which in the period since 1930—during the depth of the depression—had spent £2,147,972 on properties, fixtures, and plant. This had meant that large numbers of people had been given employment by the firm, quite apart from its own 17,788 employees, an achievement only possible because it had the funds available and because the directors had sufficient faith both in the firm and in the country to put the work in hand in bad times.

The new works at Beeston were officially opened last July. The building already erected formed only an instalment of the complete plans for the site. The results achieved by the reorganisation made possible by the new works had more than fulfilled expectations, and the directors had decided to go ahead immediately with another unit at Beeston to cope with the increased business. Plans had been put in hand for a further block of buildings, and though the company was not yet in a position to start on the actual building the preliminary work was being proceeded with as rapidly as possible, and a great deal had already been accomplished.

On March 31 last year they had a total of 977 branches. In October they opened their 1,000th branch, and by March 31 of this year the total number of branches had reached 1,025. The increase in the number of customers was very satisfactory, and with the vast total of over 144,000,000 sale transactions during the year they had achieved a new record.

In addition to scientific research they had a large pharmaceutical research laboratory where the standard of drugs and preparations was under the most scrupulous control.

The ordinary shares of the company had been split into smaller denominations. This decision had resulted, as was anticipated, in a far wider diffusion of the shares throughout the country, and the total number of ordinary shareholders on March 31 was 16,500, as compared with approximately 5,000 a year previously. During the past year more than 7,000 visitors had inspected the new Beeston factory.

The announcement made a few weeks ago that they were instituting an experimental five-day week in Nottingham during the summer months without reduction of pay not unnaturally attracted a great deal of public interest. It was their belief that the data they would obtain by this experiment would not only be of value to themselves in determining hours of work for the future, but would throw a useful light on the whole question of workers' hours and leisure. Under present conditions, something like one-sixth of the wage-earning population was permanently unemployed. This meant that the purchasing power of the public as a whole—and therefore also of the company's potential customers—was substantially lower than it might be and fell far short of the nation's powers of production. There might be many contributory causes of this phenomenon, which had been concisely described as poverty in the midst of plenty, but the chief factor was that there was not enough money in circulation.

The directors had instituted an additional week's holiday for shop managers, who, besides their ordinary holiday, had been granted a week's leave at the beginning or end of the normal holiday season. This concession, which had meant a substantial addition to the permanent staff, was highly appreciated by the men concerned.

Given political stability, they had good reason to face the future with confidence. The country appeared to have passed through the worst of the depression, and if the Government pursued a bold and progressive policy of national recovery and so retained the confidence of the electorate, the prosperity and purchasing power of the people should steadily increase.

A resolution was unanimously adopted that the capital of the company be increased to £3,000,000, by the creation of 400,000 new ordinary shares of 5s. each.

Secondary Structure of Crystals

By S. RAMACHANDRA RAO

This article is reprinted from a recent issue of "Current Science," which is published at the Indian Institute of Science, Bangalore. The author is connected with Annamalai University. He raises some interesting points on crystal structure which may demand a revision of the simple lattice theory.

It has been increasingly recognised in recent years that the simple lattice theory of crystals is not enough to account for the various physical properties of the crystalline state of matter. The existence of a sharp melting point, the accurate lining up of crystalline planes over macroscopic distances, the enormous influence in the physical (particularly magnetic) properties due to the absorption of foreign atoms and the volume effects of crystal grains of macroscopic sizes, have all been advanced by Zwicky as properties which need a revision of the simple lattice theory. To these we may add the regularity of a disperse system of foreign atoms in a crystal as revealed by X-ray spectra, the difficulties of a satisfactory explanation of ferromagnetism on the atomic basis, the existence of anomalous diamagnetism in some crystals as those of bismuth and graphite and the little understood properties of elasticity (particularly fatigue, after-effect and elastic limit).

The simple lattice theory involves an accurate spacing up of like or unlike atoms in different directions, the interaction between neighbouring atoms being electrostatic or electron linked. It should be mentioned here that while a secondary (as distinguished from the primary or simple lattice) structure seems to be necessary for a proper understanding of several well-known properties, a simple physical picture of such a structure has not yet been conclusively developed.

Zwicky postulates a microcrystal block in a crystal as a region surrounded by a surface physically different from a similar surface taken within the block. This would suggest that the interatomic distance is smaller nearer the surface than inside the block. Zwicky estimates, for example, that the surface of such a block in rock salt crystal contains 10 per cent. more atoms per unit area than in the inter-lattice planes. If such a microscopic structure is identical with the spontaneously magnetised blocks of Heisenberg in his theory of ferromagnetism, it would follow that the surface of these blocks would not merely correspond to the regions of largest crowding of the atoms but also those across which the electrons are not ferromagnetically coupled with each other.

Differences in Wavelengths

Zwicky's calculations, based on the small differences observed between the X-ray wavelengths obtained by crystal and grating methods, led him to a value of nearly 100 A.U. for the linear dimension of the rock salt block. This would suggest that a block contains nearly 43,000 atoms. Bitter's results based on ferromagnetic data give a value of nearly 10^9 atoms in a microcrystal. These results also indicate that the dimension of the block is of the order of 100 A.U.

It may be pointed out that the secondary structure should give rise to a secondary spectrum in the Bragg reflections; however, since for every 30 planes in the above case we have a secondary surface, the grating obtained is very inefficient. However, Johnson reflected hydrogen atoms from a crystal of lithium fluoride and obtained a secondary spectrum which indicated the lattice constant to have a value somewhere between 50 and 100 A.U. It is interesting to mention here the investigations of Jaeger and Zanstra on the crystal structure of rubidium. They found the co-existence of two phases, one phase being present in the other in the form of small blocks containing 36,000 atoms; this leads to a value of nearly 100 A.U. for the secondary lattice constant. It is significant that four different methods have all suggested the same order of value for the dimension of the microcrystal.

G. L. Clark gives an excellent account of our present knowledge of the solution of one metal in another in his book on "Applied X-rays." Three cases can be broadly distinguished. In the first case, the atoms of the foreign body B replace or crowd into the lattice atoms of the given metal A. Such a crowding produces a shift in the lines of the X-ray

spectra indicating smaller lattice constants. The second case arises when there are both types of microcrystals in the alloy; the characteristic spacings of both the lattices being present in the X-ray spectra. The third case arises when chemical combinations take place involving predominantly combinations of covalent atoms; these give rise to new spacings of the lattice as revealed by X-ray spectra. It is difficult to understand these distinctions on any satisfactory basis on the simple lattice theory but once we grant the theory of secondary structure, the whole picture becomes intelligible. In type 2, both sets of microcrystals are co-existent in the alloy in large groups, while in the first case the foreign atoms are able to permeate through the microcrystal surfaces into the blocks. The relative quantities of the two constituents settle the nature of the structure of the alloy. At present there is no satisfactory basis for the energy calculations in such cases but there is little doubt that the nature of the permeation of the foreign atoms in the given crystal is fixed by energy considerations. A development along these lines is necessary if the theory of secondary structure is to be placed on a satisfactory quantitative basis.

A Significant Result

It is interesting to note that the strongly ferromagnetic iron and the strongly diamagnetic bismuth do not dissolve in each other. This result is significant from the point of view of secondary structure since it seems possible that the consolidating tendencies of the microcrystals of these metals are too strong for the disruption of the individual microcrystals. Another important observation that needs special notice is that when small quantities of a foreign metal are alloyed with the given metal, the lattice constant does not alter while there is a large alteration in the magnetic susceptibility. On the simple lattice theory it is doubtful whether a reasonable explanation can be given for this observation. On the theory of the secondary structure in crystals, this would mean that the foreign atoms place themselves on the microcrystal borders, and while influencing greatly the magnetic properties so largely dependent on the large electron orbits on the microcrystalline surfaces, do not affect the lattice constant predominantly settled by the interior atoms.

That the foreign atoms in the microcrystal borders is beautifully verified by the lower melting point in general of the alloys; since the disruptive tendency between the microcrystals amplified by the presence of the foreign atoms, is mainly responsible for melting. These microcrystals, with their borders very fuzzy and their internal structure rendered less stable, account for the persistence of a crude crystal structure in liquids just after melting. As the liquids are heated this structure is broken rapidly.

Properties of Colloidal Powders

The writer has recently investigated the magnetic properties of colloidal powders of strongly diamagnetic and ferromagnetic metals. As a result of these observations and the recent investigations of Goetz, there is abundant evidence to show that when the colloidal powders approach small diameters of the order of 1μ , large changes take place in their magnetic properties. The X-ray spectra of such colloidal powders appear to pass over from those corresponding to crystal powders to those of liquids, at smaller diameters. In certain experiments conducted by the writer some three years ago on the conductivity of compressed colloidal powders of Ceylon graphite the specific conductivity of particles having diameters less than about 1 to 2μ , was larger than of those having larger diameters. The investigations were not pursued at the time since the explanation of such an observation remained obscure. It now appears, however, that such an effect may be genuine and may be accounted for by proportionately greater surface conductivity. Thus the particles having

diameters greater than about 1.5μ differ in properties from those having smaller diameters. The writer has shown recently that this may be due to the destruction of a large number of microcrystals on the surface of the macrocrystals.

It is significant that Goetz, to whom we owe a large amount of useful and pioneer work on magnetism and crystal structure, has found that the crystal planes line up regularly over macroscopic distances. A similar secondary structure has been observed by Bitter in magnetised crystals of nickel and iron.

In the theory of ferromagnetism, the secondary structure in crystals plays a predominant part. It is well known that Heisenberg's theory of ferromagnetism postulates the existence of a large number of microcrystals in a crystal. The resultant spins in these microcrystals have random orientations and compensate each other in the absence of an external field. The

large amount of work accomplished by various investigators on thin films and the recent work on nickel colloids by Montgomery and the writer point to the correctness of the assumption of microcrystals in ordinary crystals. Based on these, Bitter has given a theory of ferromagnetism by which he has accounted for the properties of hysteresis and the Curie points in ferromagnetic bodies.

It should be mentioned here that the theory of secondary structure is not without its limitations. Smekal claims that the results obtained with shearing stresses in crystals, particularly in rock salt, definitely indicate the existence of only an ideal lattice. While, therefore, the problem of the Zwicky structure in crystals like rock salt may be an open question, there seems to be, from what we have explained in this article, very little doubt regarding the existence of such a structure in metallic crystals.

Insulin Imports

Protest Against "Foreign Monopoly"

In the House of Commons on June 4, Mr. H. Williams moved an amendment to leave out Clause 5 (Repeal of Customs duty on insulin) from the Finance Bill. He said that it was a little inappropriate that on the day the announcement was made that Dr. Banting had been honoured they should be asked to pass a clause which would probably have the effect of handing over to a foreign monopoly the manufacture of insulin, discovered by this young and distinguished Canadian medical man. The increase in the duty from 10 per cent. to 33½ per cent. was not followed by any rise in the price of insulin. There was no evidence that any sufferer from diabetes in this country had been prejudiced. At the end of about two months the British firms manufacturing the drug were in a position to offer lower prices, and the British price to-day was lower than that at which the Danes were selling before the duty. The Government ought to explain why they had altered their policy.

Dr. Howitt (Reading) said that this country to-day produced a finer and purer insulin than any other country. It would pay Denmark to sell her insulin here at a loss for a period if she could succeed in closing down our own manufacturing.

Mr. M. Beaumont (Aylesbury) said that the value of this duty was that it gave the manufacturers of this country a security of market which would encourage them to go on manufacturing this commodity. If they were assured of a market they could still sell insulin of superior quality as cheaply as the foreign product. It was not wise to leave a commodity of this sort in the hands of a foreign monopoly, when it might be used as a bargaining weapon in negotiations between nations.

A Kind of Accident

Mr. Chamberlain said that if the history of this matter were examined it would be seen that the imposition of a 33½ per cent. duty on imported insulin under the Safeguarding of Industries Act was a kind of accident. Insulin was not picked out by the Government as an article of such importance to the country in war time that it must be safeguarded. The omission of insulin from the list of fine chemicals was challenged by the Association of British Chemical Manufacturers. The Board of Trade took up the challenge and opposed the inclusion of insulin. The matter was taken before a tribunal, which decided that insulin must in fact be included in the list. The purpose of the Association was to establish the principle that certain biological products should be defined as fine chemicals. Having established that principle by the decision of the tribunal, they were not particularly interested in insulin. He (Mr. Chamberlain) did not want it to be supposed that this clause was introduced in the Bill because of any improper behaviour on the part of the chemical manufacturers of this country. Indeed, it was very much to the credit of the British manufacturers that they had not only continually reduced the price of insulin, but had produced insulin of a quality which had established a special reputation both here and

abroad. Why then did the Government repeal this duty? He must admit that he had a special responsibility for the initiative in this matter. Representations were made to him to the effect that diabetics felt that the price of insulin was higher than it would have been but for this duty which had been accidentally imposed. Diabetes was a case of a deficiency which had to be supplied continuously, and there were a considerable number of people to whom insulin was a matter of life or death. Even if they thought mistakenly that they had to pay more than they ought or than was necessary by reason of a duty put on by the Government, they would have a just cause for complaint. Since the announcement that the duty was to be repealed there had been a further reduction in price.

Repeal of the duty left the British manufacturer free to make application to the Import Duties Advisory Committee for a duty to be placed on imported insulin. There would be an inquiry into the facts of the case, and if the Committee came to the conclusion that diabetics would suffer they would, he imagined, make a recommendation accordingly. The Government could not contemplate with equanimity a situation such as that which had been imagined by Mr. H. Williams, and if a recommendation were made to them, supported by evidence that such a process was actually taking place, the Treasury would have no hesitation in making an Order.

Mr. D. R. Grenfell said that the Opposition wished to tender their unreserved appreciation of the Government's action in this matter, and they were anxious that the Committee should wholeheartedly approve of that action.

The clause was ordered to stand part of the Bill.

The Gas Referees Threatened

A New Development of Bureaucracy

"THE Independent" of June 9 stated that it was not surprised to learn from Dr. Charles Carpenter that the Board of Trade seeks powers in the new Gas Undertakings Bill to abolish the Gas Referees. The independence of the Referees, while beneficial to the public and satisfactory to the industry, has long been detested by the clerks in Whitehall. For the referees are scientific experts, whose sole business it is to see that gas companies supply gas of the legal standard of quality and who are not concerned to harry the companies or to make work in form-filling and the like for another new and large section of the Board of Trade. Dr. Carpenter, as president of the South Metropolitan Gas Company, speaks for the whole gas industry when he expresses the hope that the referees will be allowed to continue their duties. But the Government in recent years has shown itself so unfriendly to the gas industry, which has never sought the State aid so lavishly given to its electrical competitors, that "The Independent" fears the worst unless indeed unofficial members of the House of Commons can be induced to check this new development of bureaucracy.

Efficient Crushing and Pulverising

Meeting the Demands of Modern Industry

THERE is probably not a single industry in which, directly or indirectly, some substance does not need reduction in size to either a granulated state or a powder. The Pulmac mill, made by International Pulverisers, Ltd., is specially designed to deal efficiently and economically with a wide range of materials and can be adjusted to give any required fineness from a coarse granulation to an impalpable powder.

In this mill the operation of grinding is effected by beating, shearing and crushing, the material being fed automatically with adjustable feed to the central orifice of the mill where the maximum portion of the reduction is carried out. The result of this is less expenditure of h.p. as the hardest work is performed near the shaft by a shearing action and not at the periphery. From here the material is drawn by centrifugal force between a revolving crown of manganese steel (armed with beaters and jagged serrations) and a stationary crown which is also fitted with grinding rings. The adjustable clearance between the crowns is decreased between each grinding surface to a minimum at the periphery.

When impalpable powder or fine grinding is required, a sieve is employed which is placed in a drum round the revolving crown. The final reduction is done on the sieve, and this work is reduced to a minimum as the material must be very fine before it can pass the grinding rings at the periphery. Thus the sieve has little work to perform; therefore its life is considerably lengthened.

The standard Pulmac mill, shown in Fig. 1, clearly shows the crowns with the beaters, grinding rings and jagged serrations. Fig. 2 shows the Pulmac mill fitted with

the centre towards the periphery. These crowns are of unique design and fully patented. The range of materials with which they deal efficiently is very large; they granulate cork and rubber, giving a minimum of dust, or shred materials such as asbestos, leather, etc., while they can equally efficiently pulverise paper and roots.

The standard Pulmac mill is made in four sizes, all being built to stand the roughest usage and the most abrasive materials. The Pulmac mill, fitted with the rasped crowns, is made in the two sizes only.

Through the operation of the rotor and stationary crowns, the material is subjected to



Fig. 1.—The Pulmac Standard Mill.



Fig. 2.—The Pulmac Mill with Rasped Crowns.

rasped crowns, these being interchangeable with the standard crowns. The rasped crowns are made of best Sheffield Chromax steel, their action being that of files working in opposed directions, the material passing between them from

eight successive grindings in one throughput. The output is therefore higher than given by other machines. The maximum duty being performed near the shaft and not at the periphery, less power is absorbed. The degree of fineness is determined by the clearance between the crowns (which can be adjusted in thirty seconds). A uniform product of required fineness is obtained by using sieves, the size of perforation in these being according to desired resultant. There is a wide range of these sieves, perforated to suit every requirement, round and conic holes, slot and bar from 0.25 mm. upwards. The rotors are carefully balanced to conform to their high velocity, the shaft is mounted on Hoffmann bearings, enclosed in dust-proof housings. The only wearing parts are the crowns (which are made of manganese or Chromax steel) and the sieves. The running costs are almost negligible. No skilled labour is required and the mill is simple to run and easy to clean.

The following table shows a few "spot" materials that the Pulmac mill will deal with very efficiently. Exceptionally interesting are the thyroid gland, myelin and pancreas, the reduction of which to 80 mesh has not been successfully done before. The Pulmac mill, however, will treat an enormous number of materials,

and potential users are invited to visit the demonstration station at Westminster.

Material.	Output (lb. per hour).	H.P.	Fineness. (mesh).
Cellulose acetate ..	250	15	50
Chemicals ..	100-2,240	15-25	As required.
China clay ..	3-5 tons	25	200
Cork ..	300-500	25	50
Darius root ..	200	30	100
Kaenit ..	3,000	20	100
Lavender ..	500	25	50
Myelin ..	100	25	80
Pancreas ..	150	25	80
Quinine ..	650	25	100
Seaweed ..	300	25	100
Thyroid gland ..	100	25	80

Pulverising for the Trade

GRINDING or size reduction, which calls for experience with a wide range of plant, is best left to the firms specialising as general grinders or pulverisers to the trade. One of the largest and most up-to-date concerns acting in this capacity is The Central Pulverising Co., Ltd., whose main works are situated on the waterside, enabling raw materials to be taken overside from steamer for lighterage, thereby saving heavy landing, wharfage and delivery charges. In addition to the crushing, grinding, pulverising and grading of materials to any commercial degree of fineness, their activities include the "complete ship to shop-counter service." A department for proprietary packing in all types of containers is maintained for this service, which relieves customers of difficulties up to the delivery of the packed product carriage paid. Closely allied to this proposition is a blending section, where any formula for dry mixing is accurately performed. Every care is exercised in these departments to safeguard customers' interest. Chemical manufacturers and others with grinding, blending or packing problems, will do well to establish contact with this firm whose comprehensive services are deserving of the widest attention.

Society of Glass Technology

Some Coming Events

THE 163rd ordinary general meeting of the Society of Glass Technology will be held at the University, Sheffield, on Wednesday, June 20, at 2 p.m., to discuss the following papers:—"Some Implications of the Known Variation in the Strength of Glass," by W. M. Hampton, Ph.D., B.Sc., F.Inst.P., and C. E. Gould (Chance Bros. & Co., Ltd.); "The Breaking Load of Sheet Glass," by A. J. Holland, M.Sc., and Professor W. E. S. Turner; and "The Bursting Pressure of Glass Bottles," by B. Longmuir, B.Eng., and Professor W. E. S. Turner.

Arrangements have been completed for the visit of the London Section to Cambridge on July 7. The works of the Cambridge Instrument Co., Ltd., will be visited at 11 a.m., and lunch will be taken at the University Arms Hotel at 1 p.m. Peterhouse Chapel will be visited at 2.15 p.m.; and King's College Chapel at 3.15 p.m. Those who do not go in private cars will travel on the 9.35 a.m. train from King's Cross (Special Saturday return fare, 7s. 2d.). Those proposing to join the party should at once advise the hon. secretary of the London Section, Mr. T. C. Crawhall, Science Museum, South Kensington, London, S.W.7.

A new, revised edition of the directory for the British glass industry is now in the press and will be available shortly. The Society has also in preparation a monograph by Dr. J. H. Partridge entitled "Tank Blocks for Glass Melting Furnaces." This will be published before the end of the year. Price to members, 5s.; to non-members, 7s. 6d.

THE first quarter of 1934 registered an increase in benzol production over the corresponding 1933 period, according to the United States Bureau of Mines. The output in the January-March period of 1934, estimated from the production of coke at by-product ovens known to recover benzol, totalled 17,661,000 gallons, in comparison with 11,393,000 gallons in the first three months of 1933.

The Highest Form of Business

Advertising and Trade Revival

SIR ERNEST BENN was one of the principal speakers at the tenth annual convention of the Advertising Association, which was opened at Leicester on Monday. Referring to the responsibility of advertisers, he said business was the highest form of citizenship, and advertising the highest form of business. He was not suggesting that they should use their advertising power to push their political ideas, but he was suggesting that it was altogether wrong that their advertising power and money should be used to push ideas with which they wholly disagreed. There were many men who firmly believed that civilisation was in jeopardy from wild political ideas. These people knew the one thing essential in these crucial times was to keep the National Government, or something like it, in the saddle. Yet they found men holding these views shovelling fortunes at the disposal of periodicals established for the very purpose of bringing the Government down.

Lord EBBISHAM, who presided, said the last few months had witnessed a rapid expansion in the home market despite the enormous, though now happily dwindling, army of unemployed. By the wider employment of modern advertising and marketing methods this movement, he was confident, might be carried much further yet. In respect of whole classes of goods it was utterly fallacious to suppose that saturation point was even within sight. In the case of most of the newer consumer goods there were immense possibilities of expansion, and it should be their task to see that those possibilities were turned into realities.

Dr. LESLIE BURGIN, Parliamentary Secretary of the Board of Trade, speaking at the manufacturers' session, said advertising as a means to achieve national recovery was legitimate, practicable, and desirable. Never had there been such a security in the home market at any time since the industrial age began; never had there been in any country greater thought given to the question of social services. In no country comparable in any way was the cost of living so low, political freedom more firmly secured, or conditions anything like so stable.

W. J. Bush and Co. Ltd.

Increase in Net Profit

PRESIDING at the thirty-seventh annual general meeting of W. J. Bush and Co., Ltd., held in London, on June 8, Mr. J. M. Bush, chairman and managing director, said the increase in net profit amounting to £11,421 was very satisfactory. It was mainly due to the improved trading by the company's Australian and South African branches and also in the home market. Unfortunately, there was no improvement in export trade. The development of the fine chemical section of the company business was showing a satisfactory reward for the hard work and risks which had been taken in building it up. The company's chemists were very keen on their work, and steadily improved the efficiency of processes and introduced new products. This involved, however, continuous capital expenditure. The Mitcham works were again in full working order; the reconstruction had afforded an opportunity of improving the lay-out of the plant, with the result that important economies in working had been made.

Bank loans showed a decline of £14,000, while the cash position showed an increase of nearly £10,000. Stock is larger by close on £10,000. Creditors, on the other hand, showed an increase of £28,635, but this was counter-balanced by an increase in debtors and bills receivable of £29,577. All the subsidiary companies showed an increase in profits during the year, and possessed substantial surpluses. The value of their assets was greatly in excess of the figures at which these investments were taken in the balance-sheet.

After providing the amount required for dividends on the preference shares, income-tax, exchange and contingencies, there remains a balance of £166,428, which is being dealt with as follows.—By the payment of a final dividend of 7 per cent. on the ordinary shares, making, with the interim dividend already paid, 11 per cent. for the year; placing £25,000 to general reserve, bringing it up to £225,000; writing down goodwill by £22,000, and carrying forward £91,928.

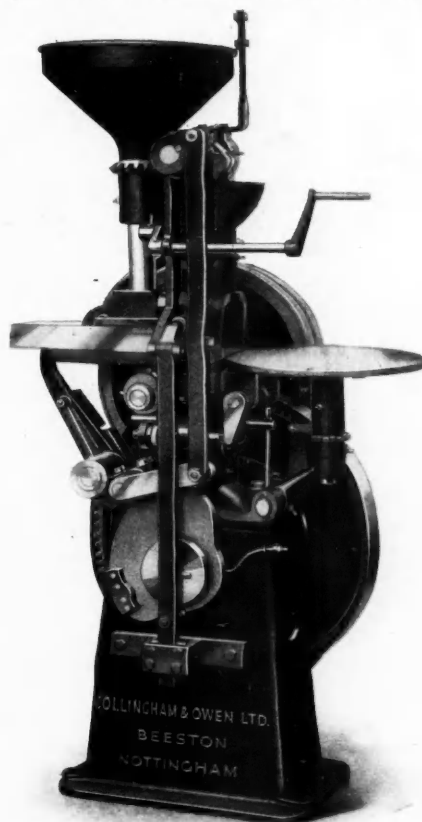
Works Equipment News

Power Presses for Making Compressed Blocks

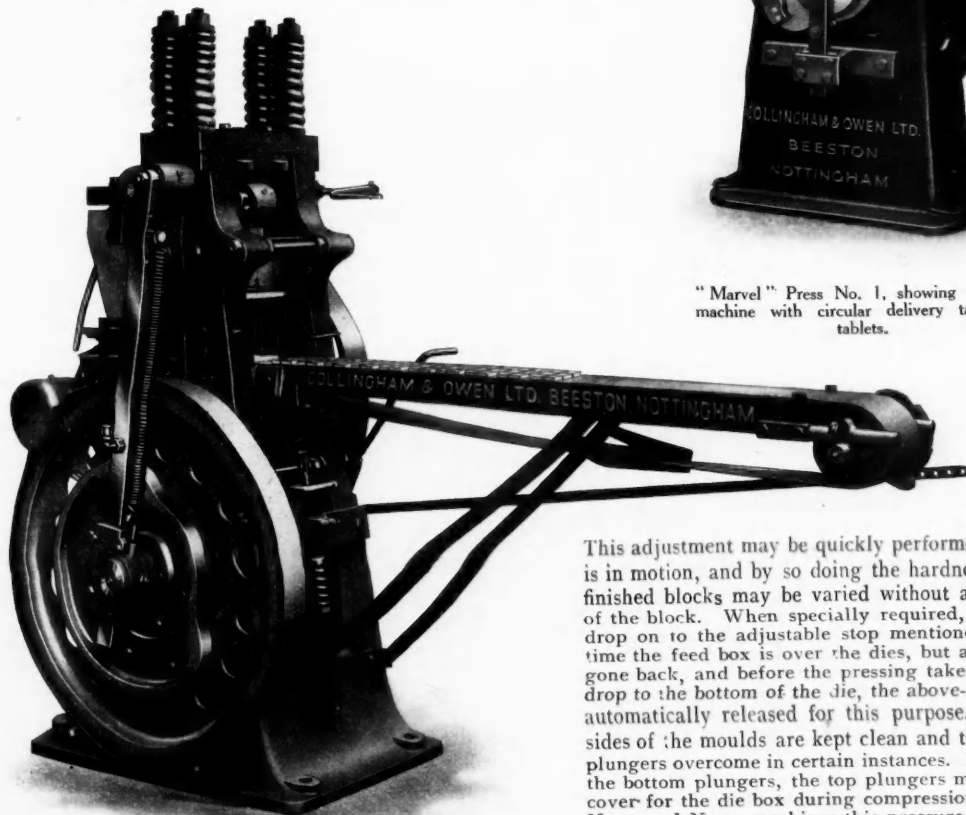
FOR over fifty years, Collingham and Owen, Ltd., have been manufacturing machines for compressing blocks and tablets. Their "Marvel" automatic presses embody all the latest improvements evolved during this period. These machines have been designed to deal with small, moderate and large outputs. The total pressure applied for three sizes is respectively 4, 16 and 32 tons. Assuming the material to be compressed requires a ton per square inch, then the number of blocks compressed per operation would be 4 blocks 1 in. square, or one block 4 sq. in. area; 16 blocks 1 in. square, or one block 16 sq. in. area; or 32 blocks 1 in. square, or one block 32 sq. in. area. Among the materials which have been successfully dealt with are lemonade crystals, carbonate of soda, bath salts, washing blue, black lead, naphthalene, boiler composition, borax, and the various lines of compressed goods as marketed in tablet form.

In order that this type of machine shall work really successfully, it is essential that special features are incorporated to ensure consistent output, reliability and full automatic action, both for feeding the material to be compressed, and the delivery of the finished blocks. The feed hopper which contains the loose material is circular, and is revolved a little at each stroke of the press, and in so doing feeds a supply of the material through a vertical tube into a sliding feed box, which passes over the die when the top plungers are raised and the bottom plungers lowered. This sliding feed box fills the dies, and at the same time pushes the previously pressed blocks on to the delivery conveyor band. This feed box is operated by a lever working on a cam, and is fitted with agitating mechanism to ensure the material feeding uniformly into the dies.

To enable the correct quantity of material to be fed into the dies, the drop of the bottom plungers in the die can be altered by means of a hand wheel in front of the machine.



"Marvel" Press No. 1, showing standard machine with circular delivery table for tablets.



"Marvel" Press No. 2, in use as lemonade tablet press.

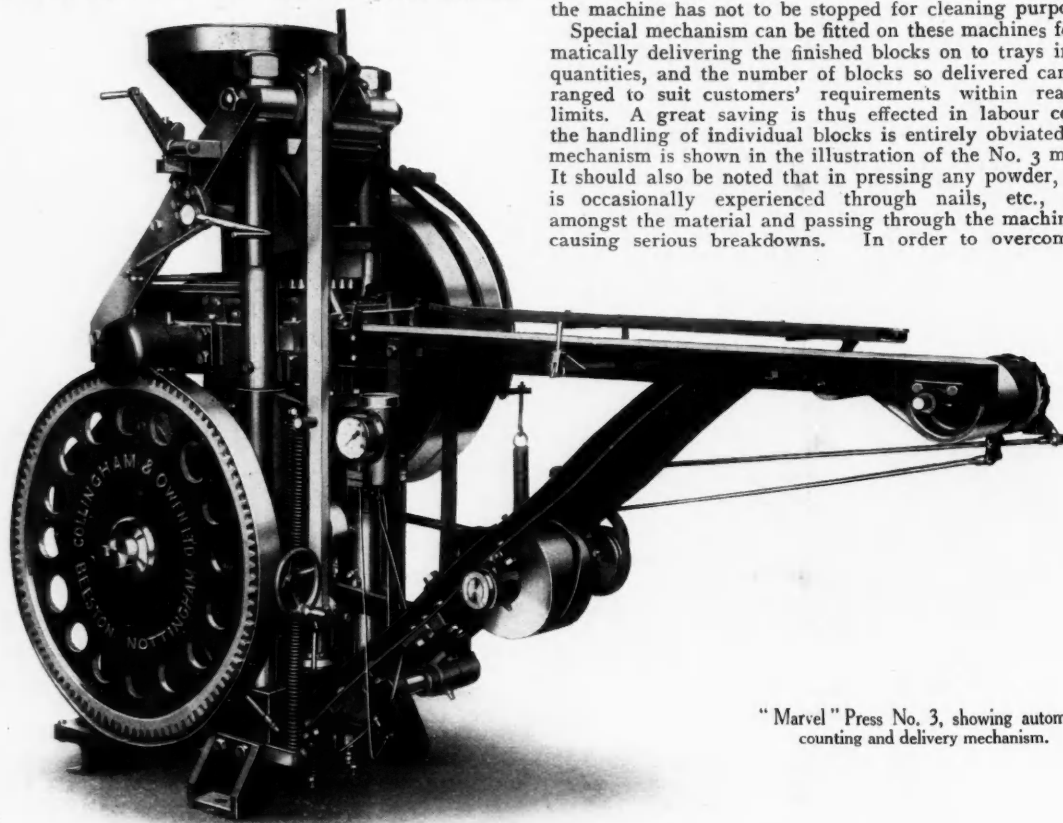
This adjustment may be quickly performed while the machine is in motion, and by so doing the hardness and weight of the finished blocks may be varied without altering the thickness of the block. When specially required, the bottom plungers drop on to the adjustable stop mentioned above, during the time the feed box is over the dies, but after the feed box has gone back, and before the pressing takes place, the plungers drop to the bottom of the die, the above-mentioned stop being automatically released for this purpose. By doing this, the sides of the moulds are kept clean and the trouble of sticking plungers overcome in certain instances. Pressure is applied to the bottom plungers, the top plungers merely acting as a top cover for the die box during compression. In the case of the No. 1 and No. 2 machines this pressure is obtained by means of a cam action only, but in No. 3 machine, only the first portion of the pressure is applied by this means, the final and high pressure being obtained by means of an automatically

controlled hydraulic system. This system has great advantages when dealing with these heavy loads, as at the time of maximum stress, practically all load carrying surfaces are motionless, and the wear of such parts is thus greatly reduced.

When necessary, the dies are made of a special steel and

punches are partially revolved in the case of round dies, and given a sliding movement in the case of square, rectangular or other shaped dies, and continue to do so until the blocks leave the die. This gives the tops of the blocks the same smooth finish as the sides and also increases the output as the machine has not to be stopped for cleaning purposes.

Special mechanism can be fitted on these machines for automatically delivering the finished blocks on to trays in given quantities, and the number of blocks so delivered can be arranged to suit customers' requirements within reasonable limits. A great saving is thus effected in labour costs, as the handling of individual blocks is entirely obviated. This mechanism is shown in the illustration of the No. 3 machine. It should also be noted that in pressing any powder, trouble is occasionally experienced through nails, etc., getting amongst the material and passing through the machine, thus causing serious breakdowns. In order to overcome this,



"Marvel" Press No. 3, showing automatic counting and delivery mechanism.

hardened by a patent process, giving a glass hard surface, and consequently these will last for some years. The top and bottom plungers are also hardened and ground. Another special feature is the method of keeping the tips of the top plungers clean when required. Just as the maximum pressing pressure is coming on to the blocks, the top punch or

Collingham and Owen, Ltd., have designed this machine with safety devices where any chance of a breakage is likely to occur. If by any chance the feed box should jam, and refuse to move from under the top plungers, the latter will simply come down on to the feed box, and the machine will continue to run until the feed box has been freed.

Ultra-Violet Fluorescence

THE characteristic fluorescences of materials which are shown in ultra-violet radiation permit of rapid tests which are of very great service in industry. The method is in regular use for the inspection of raw and worked textile materials, papers, dyes, chemical products, drugs, minerals, gems, etc. It is also used in the examination of alimentary and other bodily secretions, cultures, etc., and in dermatology. It allows of the differentiation in many cases between synthetic and natural products, between vegetable and mineral oils, artificial and genuine amber, etc. The qualitative examination of foodstuffs for adulteration is another important field of application. A recent example in this direction was the detection of the obliteration of country of origin marks on eggs, an ultra-violet fluorescence cabinet made by Kelvin, Bottomley and Baird, Ltd., being used in court during the prosecution of the offender.

Bacterial damage in wool, cotton, etc., ordinarily invisible, is shown up strongly by the fluorescences exhibited under ultra-violet radiation when examined by the K.B.B. cabinet. Qualitative analysis by examination under ultra-violet radiation in a large number of cases is very readily and rapidly carried out.

An application of interest to analytical chemists may be referred to, namely, the titration of muddy liquors. To an

ordinary neutral solution a drop of saturated solution of quinine sulphate is added as an indicator; while the solution is alkaline the fluorescence under ultra-violet radiation is very small but the approach to acidity is heralded by an intense blue fluorescence due to the temporary and eventually permanent formation of the acid sulphate of quinine. An important application in the textile, proofed cloth, rubber and leather trades is the showing up of incipient fading of colours and dyes which are being tested for fastness by means of the K.B.B. fugitometer or by natural sunlight.

The K.B.B. chemists' fluorescence cabinet is adapted for a number of different uses, among which may be mentioned the general examination of substances for their characteristic fluorescences when flooded by ultra-violet radiation in the absence of visible light; the inspection of substances by transmitted ultra-violet radiation; the general irradiation of substances by the quartz lamp either through filters or direct, and as a microscopic illuminant providing a largely monochromatic light.

The metal housing for the quartz burner in this cabinet is mounted on a base fitted with supports so arranged that a large compartment beneath it is flooded with ultra-violet radiation, the visible light being filtered off by a removable light filter let into the floor of the lamp enclosure. A cur-

tain excludes extraneous light, allowing the fluorescences of substances to be shown up strongly. In the front wall of the housing another removable light filter is fitted so that a horizontal beam of radiation is provided which allows of the viewing of materials by transmitted radiation. A slide in front of the filter shuts off the beam when necessary. An



The K.B.B. Fluorescence Cabinet.

extra slide arranged to take an iris diaphragm for microscope illumination and special radiation filters can be supplied. An adaptor may be fitted to this slide for taking quartz cells, substances to be viewed by transmitted radiation, etc. Removal of the light filter in the lamp housing allows of the whole radiation from the quartz lamp to be used when desired.

Water Treatment Equipment

INSTALLATIONS for injecting chemicals such as sulphate of alumina, milk of lime or silicate of soda, into water supplies,



The Chemical Injector.

are supplied by George Kent, Ltd. The method usually adopted is that of inserting a Venturi tube into the main. The differential head caused by the tube is utilised to control

the position of a tapered plunger. An orifice of predetermined area is provided in the tank containing the solution, and as the plunger rises or falls in the orifice, the cross section of the passage is increased or decreased. As the flow in the main is proportional to the square root of the differential pressure which governs the movement of the plunger, it is obviously possible to design a shaped plunger which will maintain the flow of solution at its correct percentage.

It will be seen from the accompanying illustration that a tank, of suitable material for the chemical being used, is surmounted by a structure supporting a knife-edge bearing. This bearing is the fulcrum of a rocker arm which has attached to one end of it the stem of the calibrated plunger. The upstream section of the Venturi tube is connected by a pipe to one of two float chambers and the "throat" or constricted portion to the other. In these chambers there are floats which rise and fall according to the differential head produced. A differential gear is mounted across the top of these float chambers, and it is from this gear that the rocker arm derives its motion. The main is tapped for the injection pipe down-stream of the Venturi throat so as to avoid any obstruction or corrosion of the throat piece, the connecting pipes and the float chambers. Usually a float valve is provided to control the supply of the chemical solution from the mixing tank. In one installation supplied by George Kent, Ltd., silicate of soda is injected at the rate of 30 lb. to 600 gallons of water, and the maximum flow through the main is 50,000 gallons per hour.

Where an open stream has to be treated it is obviously not possible to employ the Venturi tube, and installations have been successfully completed which derive their operating head from weirs. In this type of injecting gear one end of the rocker arm is depressed by a cam the shape of which is determined by the law of discharge of the particular weir plate. One example of the weir type of installation is an injector for adding sulphate of alumina solution at the rate of 84 litres per hour with a maximum flow over the weir of 2,400 cubic metres per hour. In this apparatus the tank was made of well oiled hardwood, and lined with lead sheeting, the float valve, orifice and plunger being made of vulcanite, and all other parts of non-corrodible material.

Disc Valves with Monel Metal Discs

THERE are certain pieces of equipment in all works which are almost invariably taken for granted until something goes wrong. This is generally the case with pump valves, which are usually hidden inside the pump casing, in an excellent position to be completely forgotten. Where corrosive conditions exist, however, pump valves must be given a certain amount of consideration and they have, in fact, been highly developed within recent years.

One of the most popular pump valves in use at the present time is the well-known Kinghorn patent valve, an all-metallic valve in which metal is used in place of indiarubber, fibre and leather, all of which were common materials for pump valves. The elimination of vegetable and animal products by a metallic material has important advantages. Kinghorn valves are made by the Metallic Valve Co., Ltd., and consist of a number of superimposed metallic discs. Three discs are usually fitted, but in certain cases there may be four or even five. These discs are free to move independently on a central stud and, as the valve is opening, they separate and allow particles of fluid to pass between them. The layers of fluid so formed serve to cushion the impact of the valve against both guard and stud, thus lessening noise and reducing to a minimum the strain on both valve and stud. Other forms of metallic valves sooner or later pound themselves to bits, and pieces often get into the pump and cause serious breakdowns. Vegetable and animal materials also disintegrate, thereby impairing the efficiency of the pump and providing a further cause for trouble.

The materials from which pump valves are made have an important bearing on the service which may be expected from them. Monel metal is used for the superimposed metallic discs in Kinghorn valves because the strength, ductility and excellent corrosion resistance of this alloy ensure that the valve will function without attention over a very long period and will remain practically unaffected by hot water or engine oils, which so rapidly cause deterioration of rubber and other non-metallic materials. The fact that

Monel metal is resistant to a wide range of acids and to all alkalis enables Kinghorn valves to be employed in pumps for innumerable purposes.

A high degree of ductility in the material used for the discs is important because this permits a very small pressure to be used to bind the valves tightly to their seats. The mechanical efficiency of these valves has been raised to its present high level because of the ductility of Monel metal. Although Kinghorn valves are particularly robust, they are lighter than ordinary rubber or cast brass valves used for the same service and therefore they absorb less power. The discs are usually made from 16 gauge Monel metal strip. The use of suitable materials and sound design gives these valves great durability with resultant economy. Apart from this consideration, the lightness and cushioning of the discs greatly diminishes the liability of the studs and guards to crystallise and fracture.

Kinghorn valves can be applied to practically all existing forms of reciprocating pumps where lift valves or clacks are used. They are used in numerous chemical works and other places where corrosion problems are involved.



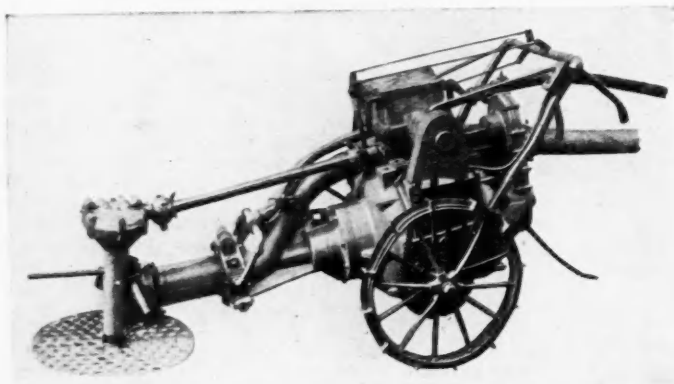
A Standard type Kinghorn Multiplex disc valve. (By courtesy of the Metallic Valve Co., Ltd.)

A Conveying System for Pulverised Material

THE Fuller-Kinyon system for conveying, elevating and distributing dry pulverised materials offers to manufacturers and users of pulverised materials many radically novel functions and methods, in addition to direct economies in the handling of materials. The system, which includes a portable unloader, provides for the handling of any dry pulverised materials to maintain the most efficient flow through a manufacturing process with timed automatic and remote control for blending, mixing and distributing operations from a convenient central point.

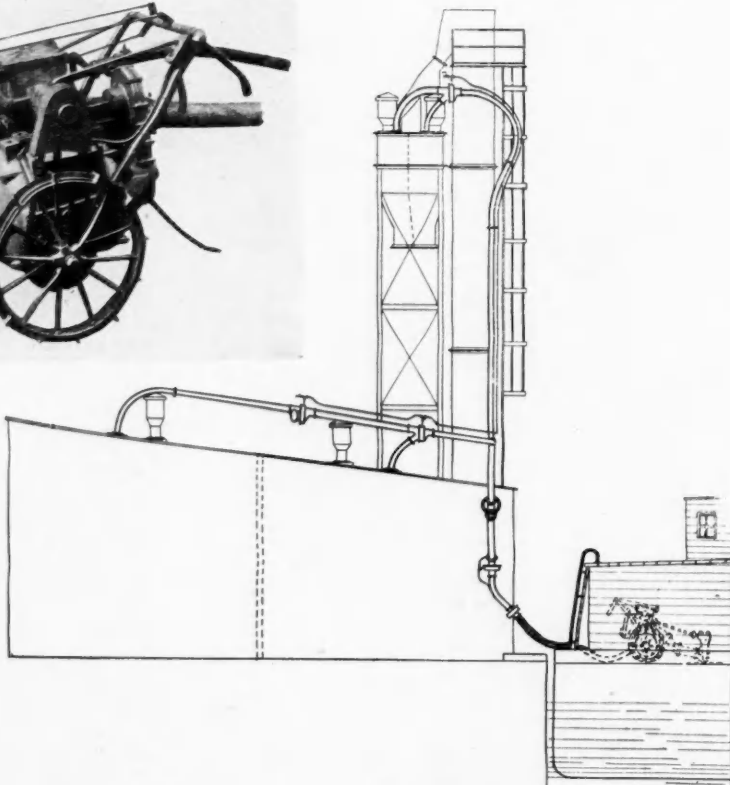
This system, for which the sole licensee for England and France is E. Constantin, Ltd., should not be confused with pneumatic conveyors, or blowing systems, which transport materials through pipe lines by air velocity. The Fuller-

Kinyon pump is designed to take advantage of the peculiar characteristic of dry, pulverised materials to become fluent or "flood" when mixed with air. In this aerated, fluent state the material can be forced by mechanical pressure through a pipe line system of considerable length and elevation. Material entering the pump hopper is advanced through the barrel by a rapidly rotating impeller screw, having flights decreasing in pitch toward the discharge, which compact the material to form a "seal" to resist the rearward escape of air injected slightly beyond the terminal flight of the screw. This air considerably expands the material and renders it fluent, so that it can be forced through the transport line by the introduction of new material by the pump screw. The material discharged from the system flows to a substantially flat level.



Above: The Portable Fuller-Kinyon Pump for Pulverised Material.

Right: The Portable Fuller-Kinyon Pump applied to the unloading of a barge.



but quickly loses its fluidity. The normal operation of feeders, weighing or packing machines is not affected in any manner.

The system comprises a self-propelled portable Fuller-Kinyon pump and a transport pipe line (including a section of rubber hose specially constructed to resist wear, which forms the connection between the pump and the steel pipe line leading to the various receiving bins). If deliveries are to be made to storage or more than one mixer bin, the flow of cement through branch lines is controlled by two or three-way diverting valves. Bin signals are furnished to operate signal circuits to warn the operator when the receiving bins are full. As the material to be conveyed must be aerated to make it fluent, so that it can be forced by mechanical pressure through the system, a small quantity of compressed air at low pressure is necessary. Fuller single-stage rotary compressors are particularly recommended for this service, in view of the compactness and low cost of the installation.

The portable Fuller-Kinyon pump is self-propelled and operated in any direction with almost no physical effort by the manipulation of two clutch levers, which independently control the movement of the two supporting wheels. A perforated disc feeder, rotating at relatively slow speed, delivers the cement to the barrel of the pump, through which it is advanced by an impeller screw, driven by a built-in motor. Beyond the terminal flight of the screw, a small quantity of compressed air (10 to 50 lb. per sq. in., depending upon the material handled and the conveying distance) is admitted through a number of small ports. This air creates an artificial flooding or fluid condition, so that the cement will be forced through the transport line by the introduction of new material by the pump screw. The machine is ruggedly constructed, and special materials are used to resist wear. The pumps are available in capacities from 1 to 300 tons per hour, based on Portland cement at 94 lb. per cu. ft. as a standard of weight.

Over 2,000 Fuller-Kinyon installations are in daily service in various factories throughout the world, two-thirds being used in connection with cement, one-sixth in connection with pulverised coal, and one-sixth engaged in handling and conveying chemical and mineral products such as gypsum, bauxite, phosphate rock, alumina, hydrated lime, fuller's earth, kaolin, manganese dioxide, starch and soda ash. England is the only leading country in Europe where the Fuller-Kinyon system is scarcely known, if compared with the very numerous installations existing in France and Germany. Interests in England are mostly in the hands of Vickers-Armstrongs, Ltd., (pulverised coal excepted); licence rights applied to pulverised coal for the British Empire belong to Babcock and Wilcox, Ltd.

Flame Cutting in the Repair Shop

DURING the past quarter century a profound change has been wrought in industrial practices through the use of oxy-acetylene cutting. Such processes as shearing, sawing, turning, planing, milling, applied either by mechanical means or by laborious time-consuming hand methods were, twenty-five years ago, the only means of severing or shaping metals. For cutting or machining steel of even medium thickness a large investment in heavy machinery was necessary, which only larger shops could afford.

To-day, however, the ease and economy of cutting by means of the blowpipe are revolutionary. Equipped with an oxy-acetylene cutting outfit, supplemented if necessary by an oxygen lance, any plant or repair shop has available the quickest and most economical means of severing steel and iron of any thickness. The fact that flame cutting is based on chemical action rather than mechanical force gives this process a flexibility that is unapproached by other methods. A blowpipe that is being used to cut sheet steel or light plate can, at a moment's notice, be switched to the job of cutting steel billets a foot or more in thickness. Development, within the past few years, of machines for guiding the cutting blowpipe has opened up entirely new fields by increasing the precision with which steel can be cut or shaped to any desired contour, no matter how irregular. This feature alone, as pointed out by "Oxy-Acetylene Tips," gives this cutting process a unique advantage over other shaping methods, and makes it of unprecedented utility. It has meant

the development of a completely new industry for the fabrication of shape-cut steel. Bases, frames, machine details, housings, mechanical equipment parts of every conceivable design, are now being shaped and fabricated with an ease and simplicity unheard of twenty-five years ago and impossible by any other process.

Well Drilling and the Drought

THE continuation of the drought is seriously affecting water supplies in many parts of the country, particularly in towns and villages dependent on shallow wells. Industry, too, has begun to feel the pinch, and large manufacturing concerns which rely principally on the mains of local water companies are becoming apprehensive concerning future supplies. It is therefore gratifying to know that many enterprising towns and industrial concerns have already obtained excellent supplies of good water by putting down new boreholes, or by deepening existing boreholes in which the water level has fallen below a practical pumping level. In most cases it is unnecessary, however, to bore below 400 ft. from surface to obtain the required submergence for the pumps. Supplies of from 5,000 to 30,000 gal. per hour are by no means unusual.

Le Grand, Sutcliffe and Gell, Ltd., are at the moment particularly busy on many large boring and heading driving contracts, and are able to report that the solution to many acute water supply problems has been found in the manner indicated. They will be pleased to furnish a considered report as to the possibilities of obtaining increased supplies to all who care to communicate with them.

Cast Iron Valves for Corrosive Fluids

VALVES for handling corrosive substances have received a good deal of attention in recent years, and many tests have been made, under both laboratory and works conditions, in an endeavour to find a material with improved life at reasonable cost. Very good service has been obtained with austenitic nickel alloy cast irons of the Ni-Resist type, and some interesting results are available from America. In one instance a valve of cast iron of the Ni-Resist type, used in contact with sulphuric acid (58-60° Baumé) in a fertiliser plant, was still in good condition after fourteen months' use, ordinary cast iron and bronze valves having failed after only a few weeks. Again, a Ni-Resist valve, used in an oil refinery for handling heavy acid sludge at about 90° C., was found to be in excellent condition after twelve months' service, ordinary cast iron valves having had a life of from three weeks to three months.

Letters to the Editor

Coating with Metals

SIR,—In an extract of specification No. 404180 of A. Folliet and N. Sainderichin under the above heading in THE CHEMICAL AGE (Metallurgical Section, page 36), June 2, it is stated that a "surface layer" is formed comprising certain specified elements. The very essence of the Follisain process operated by this company, is that the alloy does not form merely a surface layer, but penetrates the base metal and is, in fact, an inter-solid penetration by diffusion. This is one of the main points of difference between our process and that of others.

If you will refer to the specification, you will find in line 66 that the layer is referred to as a "penetrating protecting layer of aluminium," etc. We shall be obliged if you will be good enough to give the same prominence to this correction as to the extract of the specification.—Yours faithfully,

FOLLISAIN SYNDICATE LTD.

H. A. BONNEY,
Secretary.

Halifax House,
62-64 Moorgate,
London, E.C.2.

[The abstract referred to was an exact reproduction, in full, from the "Illustrated Abridgments of Specifications" published by the Patent Office. We welcome the opportunity, however, of giving the above additional information concerning the Follisain process.—ED. "C. A."]

Continental Chemical Notes

OLD ACCUMULATOR ACID WATER is now proposed as a raw material for diplogen manufacture. It is held by W. Uhlmann ("Naturwissenschaften," 1934, 119) to be equivalent in this respect to the residual liquor of electrolytic hydrogen cells.

AMONG FRENCH CHEMICAL CONCERNS reentering the dividend-paying class is the St. Therese Potash Co., which operates in Alsace and had made no distribution since 1930. The net profit for the past year rose to nearly 16 millions francs, against 3.6 millions previously.

WITH THE AID OF GOVERNMENT SUBSIDIES, intensive study is being devoted in Germany to the selection of soya bean varieties capable of thriving in the Central European climate and soil. Extensive cultivation of the bean may be inaugurated in the not very distant future. ("Chem.-Zeitung," June 9).

THE FRENCH GLASS MANUFACTURING CONCERN, St. Gobain, which also engages on an important scale in the heavy chemical industry, reports a considerably increased trading profit of 20 millions francs for 1933 (against 14 millions) and is able to resume dividend payments (5 per cent). Output increased in particular in respect of sulphuric acid, chlorine, and aluminium sulphate, whilst no difficulty was experienced in disposing of the ammonium nitrate and calcium nitrate produced at the Rouen fertiliser factory. In connection with the glass department itself, an increase in safety glass sales to the home market is reported.

IODINE PENTAFLUORIDE is formed on bringing iodine into contact with fluorine but is invariably in admixture with the heptafluoride. According to O. Ruff ("Chem.-Zeitung," June 2, p. 449), compounds with a lower proportion of fluorine than the pentafluoride could not be detected. In presence of oxygen, however, or when the pentafluoride was exposed to moisture, iodine oxy-fluoride IOF₃, could be detected.

GERMANY POSSESSES EXTENSIVE ALUMINIFEROUS DEPOSITS which cannot be worked up to pure alumina by the usual alkali treatment owing to the high silicic acid content. Investigations described by F. Gewecke in the "Chemische Fabrik," June 6, revealed the suitability of nitric acid for treatment of these minerals at elevated pressure and temperature. In the course of the investigations, iron-chrome-nickel alloys resisted attack by nitric acid at the high temperatures and pressures employed.

THIS important discovery will facilitate the large scale introduction of the new process. Hitherto the application of high pressure to acid processes of bauxite treatment was not feasible owing to the lack of sufficiently resistant plant material. It is now claimed that nitric acid treatment under high pressure can be successfully applied to all alumina-containing minerals after suitable calcination. The actual tests were carried out in a pressure vessel constructed of V2A steel. A 100 per cent. alumina yield followed treatment of bauxite (initially ignited at 600° C.) with nitric acid for over 5 hours under 11 atmospheres pressure.

News from the Allied Industries

Artificial Silk

GLANZSTOFF-COURTAULDS G.M.B.H., whose capital of Reichsmarks 12,000,000 is owned in equal parts by Courtaulds, Ltd., and Vereinigte Glanzstoff A.G., has decided to extend its works at Cologne by about 20 per cent. The 1,600 workers at the Cologne plant have been working three shifts for some time without being able to execute the booked orders.

Paper

BOWATER'S PAPER MILLS have decided to issue the £300,000 4½ per cent. first mortgage debenture stock at present unissued, and now offer it for subscription to existing debenture stockholders and shareholders at par. This stock (which forms the balance of an authorised issue of £1,000,000) is secured by a trust deed dated November 1, 1933, in favour of the Law Debenture Corporation as trustees. Interest is payable half-yearly on January 1 and July 1. The first payment, representing a full half-year's interest, will be paid on January 1, 1935.

Bleaching and Dyeing

THERE ARE CONSIDERABLE MODIFICATIONS in the latest proposals of the Federation of Unions in the Bleaching, Dyeing, Finishing and Calico Printing Trade for a revision of wages rates compared with those originally put before the employers nearly a year ago. In the first instance the Federation asked for an advance of not less than 5s. per week for men and 3s. for women, with minimum rates of 1s. an hour for adult males and 8d. for females. They now propose that the minimum base rate for male time-workers be advanced from 30s. 3d. to 34s. per week of 48 hours, and that for women from 18s. to 21s. With regard to piece-workers, it is suggested that the base rates be subject to an addition of 10 per cent., plus the existing cost of living percentage, and that all piece-work rates be capable of yielding a minimum of 25 per cent. in excess of the recognised basic rates for time-workers. At present, piece-workers are subject to an addition of 5 per cent., less 1 per cent.

Soap

THE BRITISH SOAP CO. has announced that owing to an overwhelming proportion of its output being sold at a considerable distance from Hull, it has become necessary to make alternative arrangements for the manufacture of soaps. The company was started in Hull in 1921 as a subsidiary company of the British Oil and Cake Mills, Ltd., the shares of which are held by Lever Brothers, Ltd. At one time, employment was given to several hundred men, but the number was reduced when the manufacture of certain products was transferred elsewhere. The present staff, it is stated, will not be more than 100.

Non-Ferrous Metals

A COMPREHENSIVE PROGRAMME OF TIN RESEARCH in America, initiated by the International Tin Research and Development Council, is announced in the "American Metal Market," the official organ of the United States tin trade. The main lines of research will concern the use of tin in conjunction with copper, lead and steel, and as employed in chemical compounds. Technical problems, covering new uses for the metal, are also to be studied. Investigations will be carried out at the Battelle Memorial Institute, Columbus, Ohio.

DETAILS OF THE PROPOSALS of the board of the British Aluminium Co., Ltd., for the increase of the capital and for the redemption of debenture stock were given by the chairman, Mr. R. W. Cooper, at a meeting held on June 12. Mr. Cooper said that to raise the funds necessary to effect the redemption of the North British Co.'s guaranteed debenture stock it was proposed to issue 4 per cent. debenture stock in addition to further preference and ordinary shares of the parent company. It was also proposed to rearrange the existing debenture debt of the parent company. The existing stock is to be redeemed on January 1, 1936. It is intended to make a public issue of 500,000 preference shares, and 998,966 ordinary shares, together with £1,000,000 of the 4 per cent. debenture stock.

Mineral Oil

SPEAKING at the twenty-fifth ordinary general meeting of Anglo-Persian Oil Co., Ltd., in London, on June 12, Sir John Cadman, the chairman, said production had followed its normal course throughout the year, with results which had been wholly satisfactory. Supplies of oil were drawn mainly from two fields, Masjid-i-Sulaiman and Haft Kel. The total quantity of oil obtained from these fields amounted to some seven million tons, of which five millions were extracted from Masjid-i-Sulaiman and two millions from Haft Kel. The programme of drilling to delimit the extent of the Haft Kel field had continued. During the past year the company's refinery organisation had had to deal with a considerably increased volume of work. The refineries at Abadan, Alwand, Swansea, Grangemouth, Uphall, Melbourne and Douai had to be kept in constant and efficient operation. The L'Avera refinery near Marseilles was commissioned in August last. Plans for the Kermanshah refinery had been prepared; and arrangements were in hand for a considerable extension of the cracking and distillation equipment at Abadan. The volume of sales had increased; prices, however, had remained at a low level.

Iron and Steel

THE PROSPECT OF THE AUSTRALIAN MARKET being closed entirely, and the South African market partially, to British iron and steel exports of the heavier type within a few years, was envisaged by Mr. W. R. Lysaght in his presidential address to the annual meeting of the Iron and Steel Institute on May 31. Mr. Lysaght explained that he had recently returned from a five or six months' tour of Australia, New Zealand, and South Africa. Steel works which he found at Broken Hill, Australia, were extraordinarily efficient, and among the finest he had ever seen. Ore was delivered at the furnace at 8s. a ton, and pig iron made at under £2 a ton, with an output of about 8,000 tons a week. A new works, owned by the Australian Iron and Steel Company, was springing up. It had made pipes and pig iron, had begun to make rails and sections, and was putting down sheet mills. He was afraid, therefore, that in two or three years not an ounce of heavy steel would be sent to Australia, and Great Britain would probably lose that market. In addition, Australian makers, aided by the present advantage of the rate of exchange, were sending certain iron and steel products to New Zealand.

Inventions in the Chemical Industry

Patent Specifications and Applications

THE following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Complete Specifications Open to Public Inspection

ABSORPTION SYSTEMS for cooling, heating, and heat-exchange purposes.—Siemens-Schuckertwerke A.-G. Nov. 29, 1932. 34855/32.

CONDENSATION PRODUCTS from urea or thiourea or derivatives thereof, manufacture.—Soc. of Chemical Industry in Basle. Dec. 1, 1932. 8528/33.

CELLULOSE DERIVATIVES with the exception of acetyl-cellulose and nitro-cellulose, for producing artificial silk, films, lacquers, bands, and the like from fibrous substances of all kinds, production.—Uddeholms Aktiebolag Skoghalls-Verken. Nov. 29, 1932. 21515/33.

FERTILISING SALTS.—H. Grah. Nov. 29, 1932. 30230/33.

SOLID FORMALDEHYDE, production.—Deutsche Gold-und Silber-Scheideanstalt Vorm. Roessler. Nov. 29, 1932. 32756/33.

MIXED FABRICS, manufacture.—Soc. of Chemical Industry in Basle. Nov. 30, 1932. 32783/33.

CONDENSATION PRODUCTS, manufacture and production.—A. Rieche. Dec. 3, 1932. 33153/33.

PHOTOGRAPHIC SILVER HALIDE EMULSIONS, manufacture.—I. G. Farbenindustrie. Nov. 29, 1932. 33468/33.

THREADS RESEMBLING WOOL, manufacture.—Dr. A. Wacker Ges. für Elektrochemische Industrie. Dec. 1, 1932. 33469/33.

HALOGEN DERIVATIVES OF RUBBER or like substances, production. Metallgesellschaft A.-G. Dec. 2, 1932. 33683/33.

GLAZED COATINGS, production.—K. Lutz. Dec. 2, 1932. 33754/33.

CONCENTRATION, distillation, or evaporation of liquid substances. A. Ponzini. Dec. 3, 1932. 33798/33.

CONTINUOUS DISTILLATION and rectification of mists containing acetone, ethyl alcohol, and butyl alcohol, apparatus.—Soc. des Etablissements Barbet. Dec. 1, 1932. 33829/33.

COLLOIDAL SUSPENSIONS and the process of making same.—E. H. Land. Dec. 3, 1932. 33916/33.

DYEING OF CELLULOSE ESTERS or ethers.—I. G. Farbenindustrie. Dec. 3, 1932. 34024/33.

HEAVY METAL COMPLEX COMPOUNDS of mercapto pyrimidines, manufacture.—I. G. Farbenindustrie. Dec. 3, 1932. 34037/33.

DIAZOIMINO COMPOUNDS and their application in dyeing and printing, manufacture.—E. I. du Pont de Nemours and Co. Dec. 3, 1932. 34090/33.

Specifications Accepted with Dates of Application

AZO DYESTUFFS, process for the manufacture.—I. G. Farbenindustrie. Nov. 24, 1931. 411,096.

DYESTUFFS OF THE OXAZINE SERIES, manufacture.—A. Carpmael (I. G. Farbenindustrie). Nov. 29, 1932. 411,132.

REMOVING WATER from sodium cyanide solutions, process.—E. J. Pranke. July 15, 1932. 411,177.

WATER-IN-SOLUBLE AZO DYESTUFFS, manufacture.—A. Carpmael (I. G. Farbenindustrie). Dec. 7, 1932. 411,180.

CONTINUOUS BOILING, evaporating, and concentrating plants.—Crosse and Blackwell, Ltd., and W. Clayton. Dec. 10, 1932. 411,185.

HIGH QUALITY LUBRICATING OILS, manufacture and production. J. Y. Johnson (I. G. Farbenindustrie). Dec. 23, 1932. 411,198.

CELLULAR RUBBER, manufacture.—Soc. Italiana Pirelli and U. Pestalozza. Jan. 3, 1933. 411,202.

FRACTIONAL DISTILLATION of crude petroleum, their derivatives and the like, process and apparatus.—F. S. Woidich. Feb. 20, 1933. 411,234.

STABLE EMULSIONS OF SULPHUR, production.—J. Y. Johnson (I. G. Farbenindustrie). Feb. 24, 1933. 411,241.

STABILISING ORGANIC ESTERS of cellulose, process.—O. Sindl. March 24, 1932. 411,260.

ALCOHOLS FROM OLEFINS, process for the manufacture.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. July 8, 1932. 411,303.

GLUCOSE SYRUP, preparation of a dry product.—Deutsche Staerke-Verkaufs-Genossenschaft Eingetragene Ges. Dec. 20, 1932. 411,308.

CARBONIC ACID in beverages stored in barrels, preservation.—Sparklets, Ltd., and G. E. Heyl. Aug. 1, 1933. 411,318.

MAGNESIUM ALLOYS, process of making and refining.—I. G. Farbenindustrie. Nov. 5, 1932. 411,324.

PRINTING with the aid of stable reduction compounds of vat dyestuffs, process.—I. G. Farbenindustrie. Sept. 1, 1932. 411,332.

STORING LIQUID CARBON DIOXIDE at temperatures below 0° C., method and apparatus.—Carba A.-G. May 29, 1933. 411,336.

SYNTHETIC TANS, manufacture and production.—J. Y. Johnson (I. G. Farbenindustrie). Dec. 19, 1933. 411,390.

Applications for Patents

WATERPROOF FABRICS, manufacture.—Dux Chemical Solutions Co., Ltd. May 18, 15055.

SULPHUR COMPOUNDS from gases, removal of.—Gas Light and Coke Co., G. U. Hopton and W. K. Hutchison. May 18. 15137.

WHITE LEAD, manufacture.—H. G. Hills. May 22. 15159.

PRODUCTS containing chlorinated rubber, manufacture.—I. G. Farbenindustrie. May 17. 14943.

O-AMINOAZO DYESTUFFS, manufacture.—I. G. Farbenindustrie. May 18. (Germany, May 18, '33.) 15056.

AZO DYESTUFFS insoluble in water, manufacture.—I. G. Farbenindustrie. May 18. (Germany, May 23, '33.) 15057.

DYESTUFFS, manufacture.—I. G. Farbenindustrie. May 18. (Germany, May 18, '33.) 15068.

VINYL ESTERS, manufacture.—I. G. Farbenindustrie. May 22. 15,302.

THERMAL TREATMENT of carbonaceous substances.—I. G. Farbenindustrie. May 23. (Germany, June 8, '33.) 15410.
TREATMENT of cellulose materials.—Imperial Chemical Industries, Ltd., and H. A. Piggott. May 17. 14940.
TREATMENT of resinous materials.—Imperial Chemical Industries, Ltd., and W. E. Gates. May 18. 15081.
ANTHRAQUINONE COMPOUNDS.—Imperial Chemical Industries, Ltd., P. G. Carter and R. F. Thomson. May 18. 15082.
CONCENTRATION of heavy water in water.—Imperial Chemical Industries, Ltd., D. Tyrer. May 18. 15083.
ROASTING FERRUGINOUS SULPHIDE ORES.—Imperial Chemical Industries, Ltd., and D. Tyrer. May 18. 15084.
CONCENTRATION of diplogen in water.—Imperial Chemical Industries, Ltd., and D. Tyrer. May 18. 15085.
PHENANTHRENE DERIVATIVES, manufacture.—Imperial Chemical Industries, Ltd., E. de B. Barnett, and C. A. Lawrence. May 23. 15393.
PRESERVATION OF RUBBER.—Imperial Chemical Industries, Ltd., and C. R. Mavin. May 23. 15394.
AZO DYESTUFFS.—Imperial Chemical Industries, Ltd., and C. Paine. May 23. 15395.

NAPHTHALENE DERIVATIVES.—Imperial Chemical Industries, Ltd., and M. Wyler. May 23. 15398.
MIXED POLYMERISATION PRODUCTS, manufacture.—J. Y. Johnson (I. G. Farbenindustrie). May 22. 15275.
SHAPED CATALYSTS, production.—J. Y. Johnson (I. G. Farbenindustrie). May 22. 15276.
IRON CARBONYL, manufacture.—J. Y. Johnson (I. G. Farbenindustrie). May 22. 15277.
WETTING, ETC., AGENTS, production.—J. Y. Johnson (I. G. Farbenindustrie). May 23. 15411.
DERIVATIVES OF CHRYSENEQUINONES, manufacture.—J. Y. Johnson (I. G. Farbenindustrie). May 23. 15412.
PURIFYING SULPHURIC ACID.—Mansfelder Kupferschieferbergbau A.-G. May 17. (Germany, June 21, '33.) 14936.
SEPARATING COMPONENTS of alloys of copper and silver.—A. L. Mond (I. G. Farbenindustrie). May 22. 15340.
ACID CALCIUM LACTATES.—Royal Baking Powder Co. May 23. (United States, May 23, '33.) 15384.
COMPOUNDS OF PYRIDINE SERIES, manufacture.—Chemische Fabrik Von Heyden, A.-G. May 24. (Germany, May 27, '33.) 15528.

Weekly Prices of British Chemical Products

Review of Current Market Conditions

MOST sections of the chemical products market have reported a fair amount of business during the week, and very few price changes have to be recorded. Acetone, formaldehyde, formic acid, oxalic acid and salic acid have been the strongest features in the industrial section, with a fair amount of business also in acetic acid, sal ammoniac and caustic soda. There is now a better demand for copper sulphate, but values show no improvement as yet. The barium chloride and sodium sulphide markets continue dull. Conditions in the coal tar products market show little change since last week.

A good business has been transacted in creosote oil and a fair amount of interest has been shown in carbolic acid, cresylic acid and refined tar. There is an increasing demand for pitch for autumn delivery and an improvement in prices is anticipated. Heavy solvent naphtha and xylol are rather dull items. Certain grades of benzol have been reduced. An improvement in the pharmaceutical chemicals section has been maintained. Quite a good inquiry has been received for benzoic acid, aspirin, hexamine, hydroquinone and sodium benzoate. Business in phenazine and salicylates is rather limited, and there is keen competi-

tion for orders for phenacetin. Business in essential oils has been fairly satisfactory.

LONDON.—Conditions in the London chemical market remain steady and prices are unchanged. The coal tar products section reports a fair amount of business, with no alterations in prices.

MANCHESTER.—Traders on the chemical market here report that whilst the improved conditions of the last few months have been about maintained they are finding it difficult to increase sales any further and there is a feeling that, for the present, at all events, the additional headway being made.

Deliveries against contracts, however, have been on a satisfactory scale and this week there has been a fair sprinkling of replacement orders a few of them for good quantities. To that extent business has been a little more active than it has been during recent weeks, but some measure of seasonal quietness is looked for before long when the Lancashire cotton trade holidays get into their swing. The market has been steady in almost every section and users have little to hope for in the direction of lower prices.

Price Changes

General.—BENZOL, standard motor, 1s. 3½d. to 1s. 4d. per gal.; 90%, 1s. 4d. to 1s. 4½d.

Manchester.—ACID, CARBOLIC, crude, 2s. 1d. per gal.; ACID, OXALIC, £49 to £53 per ton ex store; LEAD NITRATE, £28 per ton; POTASSIUM CHLORATE, £37 to £38 per ton; POTASSIUM PERMANGANATE, 9½d. to 9¾d. per lb.

All other prices remain unchanged.

General Chemicals

ACETONE.—LONDON: £65 to £68 per ton; SCOTLAND: £66 to £68 ex wharf, according to quantity.

ACID, ACETIC.—Tech. 80%, £38 5s. to £40 5s.; pure 80% £39 5s.; tech., 40%, £20 5s. to £21 15s.; tech., 60%, £28 10s. to £30 10s. LONDON: Tech., 80%, £38 5s. to £40 5s.; pure 80%, £39 5s. to £41 5s.; tech., 40%, £20 5s. to £22 5s.; tech., 60%, £29 5s. to £31 5s. SCOTLAND: Glacial 98/100%, £48 to £52; pure 80%, £39 5s.; tech. 60%, £38 5s. d/d buyers' premises Great Britain. MANCHESTER: 80%, commercial, £39; tech. glacial, £52.

ACID, BORIC.—Commercial granulated, £25 10s. per ton; crystal, £26 10s.; powdered, £27 10s.; extra finely powdered, £29 10s. packed in 1-cwt bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots.

ACID, CHROMIC.—10½d. per lb., less 2½%, d/d U.K.

ACID, CITRIC.—9½d. per lb., less 5%.

ACID, CRESYLIC.—97/99%, 1s. 8d. to 1s. 9d. per gal.; 98/100%, 2s. to 2s. 2d.

ACID, FORMIC.—LONDON: £43 10s. per ton.

ACID, HYDROCHLORIC.—Spot, 4s. to 6s. carboy d/d according to purity, strength and locality. SCOTLAND: Arsenical quality, 4s.; dearsenicated, 5s. ex works, full wagon loads.

ACID, LACTIC.—LANCASHIRE: Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £48; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £53; edible, 50% by vol., £41. One-ton lots ex works, barrels free.

ACID, NITRIC.—80° Tw. spot, £18 to £25 per ton makers' works, according to district and quality. SCOTLAND: 80°, £23 ex station full truck loads.

ACID, OXALIC.—LONDON: £47 17s. 6d. to £57 10s. per ton, according to packages and position. SCOTLAND: 98/100%, £48 to £50 ex store. MANCHESTER: £49 to £53 ex store.

ACID, SULPHURIC.—SCOTLAND: 144° quality, £3 12s. 6d.; 168°, £7; dearsenicated, 20s. per ton extra.

ACID, TARTARIC.—LONDON: 1s. per lb. SCOTLAND: B.P. crystals, 11d., carriage paid. MANCHESTER: 1s. 0¾d.

ALUM.—SCOTLAND: Lump potash, £8 10s. per ton ex store.

ALUMINA SULPHATE.—LONDON: £7 10s. to £8 per ton. SCOTLAND: £7 to £8 ex store.

AMMONIA, ANHYDROUS.—Spot, 10d. per lb. d/d in cylinders. SCOTLAND: 10d. to 1s. containers extra and returnable.

AMMONIA, LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb., d/d.

AMMONIUM BICARBONATE.—8d. per lb. d/d U.K.

AMMONIUM CARBONATE.—SCOTLAND: Lump, £30 per ton; powdered, £33, in 5-cwt. casks d/d buyers' premises U.K.

AMMONIUM CHLORIDE.—£37 to £45 per ton, carriage paid. LONDON: Fine white crystals, £18 to £19. (See also Sal ammoniac.)

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Sal ammoniac.)

ANTIMONY OXIDE.—SCOTLAND: Spot, £26 per ton, c.i.f. U.K. ports.

ANTIMONY SULPHIDE.—Golden 6½d. to 1s. 1½d. per lb.; crimson, 1s. 3d. to 1s. 5d. per lb., according to quality.

ARSENIC.—LONDON: £16 10s. c.i.f. main U.K. ports for imported material; Cornish nominal, £22 10s. f.o.r. mines. SCOTLAND: White powdered, £23 ex wharf. MANCHESTER: White powdered Cornish, £21 ex store.

ARSENIC SULPHIDE.—Yellow, 1s. 5d. to 1s. 7d. per lb.

BARIUM CHLORIDE.—£11 per ton.

BARYTES.—£7 to £8 1s. per ton.
 BISULPHITE OF LIME.—£6 10s. per ton f.o.r. London.
 BLEACHING POWDER.—Spot 35/37% £7 19s. per ton d/d station in casks, special terms for contract. SCOTLAND: £8 in 5/6 cwt. casks for contracts over 1934/1935.
 BORAX, COMMERCIAL.—Granulated, £14 10s. per ton; crystal, £15 10s.; powdered, £16; finely powdered, £17; packed in 1-cwt. bags, carriage paid home to buyer's premises within the United Kingdom in 1-ton lots.
 CADMIUM SULPHIDE.—2s. 7d. to 2s. 11d.
 CALCIUM CHLORIDE.—Solid 70/75% spot, £5 5s. per ton d/d station in drums.
 CARBON BISULPHIDE.—£30 to £32 per ton, drums extra.
 CARBON BLACK.—3½d. to 5d. per lb. LONDON: 4½d. to 5d.
 CARBON TETRACHLORIDE.—£41 to £46 per ton, drums extra.
 CHROMIUM OXIDE.—10½d. per lb., according to quantity d/d U.K.; green, 1s. 2d. per lb.
 CHROMIUM.—Crystals, 3½d. per lb.; liquor, £19 10s. per ton d/d.
 COPPERAS (GREEN).—SCOTLAND: £3 15s. per ton, f.o.r. or ex works.
 CREAM OF TARTAR.—LONDON: £4 2s. 6d. per cwt.
 DINITROTOLENE.—66/68° C., 9d. per lb.
 DIPHENYLQUANIDINE.—2s. 2d. per lb.
 FORMALDEHYDE.—LONDON: £27 per ton. SCOTLAND: 40%, £28 ex store.
 LAMPBLACK.—£45 to £48 per ton.
 LEAD ACETATE.—LONDON: £34 10s. per ton; brown, £1 per ton less. SCOTLAND: White crystals, £33 to £35; brown, £1 per ton less. MANCHESTER: White, £34; brown, £31.
 LEAD NITRATE.—£28 per ton.
 LEAD, RED.—SCOTLAND: £25 10s. to £28 per ton d/d buyer's works.
 LEAD, WHITE.—SCOTLAND: £39 per ton, carriage paid. LONDON: £37 10s.
 LITHOPONE.—30%, £17 10s. to £18 per ton.
 MAGNESITE.—SCOTLAND: Ground calcined, £9 per ton, ex store.
 METHYLATED SPIRIT.—61 O.P. Industrial, 1s. 6d. to 2s. 1d. per gal. Pyridinised industrial, 1s. 8d. to 2s. 3d. Mineralised, 2s. 7d. to 3s. 1d. 64 O.P. 1d. extra in all cases. Prices according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.
 NICKEL AMMONIUM SULPHATE.—£49 per ton d/d.
 NICKEL SULPHATE.—£49 per ton d/d.
 PHENOL.—8½d. to 9d. per lb. without engagement.
 POTASH, CAUSTIC.—LONDON: £42. MANCHESTER: £36 10s.
 POTASSIUM BICHROMATE.—Crystals and Granular, 5d. per lb. net d/d U.K. Discount according to quantity. Ground 5½d. LONDON: 5d. per lb. with usual discounts for contracts. SCOTLAND: 5d. d/d U.K. or c.i.f. Irish Ports. MANCHESTER: 5d.
 POTASSIUM CHLORATE.—LONDON: £37 to £40 per ton. SCOTLAND: 99½/100%, powder, £37. MANCHESTER: £37 to £38.
 POTASSIUM CHROMATE.—6½d. per lb. d/d U.K.
 POTASSIUM NITRATE.—SCOTLAND: Refined granulated, £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.
 POTASSIUM PERMANGANATE.—LONDON: 9½d. per lb. SCOTLAND: B.P. crystals, 9d. MANCHESTER: Commercial, 8½d.; B.P., 9½d. to 9½d.
 POTASSIUM PRUSSIAN.—LONDON: 8½d. to 8½d. per lb. SCOTLAND: Yellow spot material, 8½d. ex store. MANCHESTER: Yellow, 8½d.
 RUPIRON (MINERAL RUBBER).—£16 10s. per ton.
 SALAMMONIAC.—First lump spot, £41 17s. 6d. per ton d/d in barrels.
 SODA ASH.—58% spot, £5 15s. per ton f.o.r. in bags.
 SODA, CAUSTIC.—Solid 76/77% spot, £13 17s. 6d. per ton d/d station. SCOTLAND: Powdered 98/99%, £17 10s. in drums, £18 5s. in casks, Solid 76/77%, £14 10s. in drums; 70/73%, £14 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts 10s. per ton less. MANCHESTER: £13 5s. to £14 contracts.
 SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.
 SODIUM ACETATE.—£22 per ton. LONDON: £23.
 SODIUM BICARBONATE.—Refined spot, £10 10s. per ton d/d station in bags. SCOTLAND: Refined recrystallised £10 15s. ex quay or station. MANCHESTER: £10 10s.
 SODIUM BICHROMATE.—Crystals cake and powder 4d. per lb. net d/d U.K. discount according to quantity. Anhydrous, 5d. per lb. LONDON: 4d. per lb. net for spot lots and 4d. per lb. with discounts for contract quantities. SCOTLAND: 4d. delivered buyer's premises with concession for contracts.
 SODIUM BISULPHITE POWDER.—60/62%, £16 10s. per ton d/d 1-cwt. iron drums for home trade.
 SODIUM CARBONATE (SODA CRYSTALS).—SCOTLAND: £5 to £5 5s. per ton ex quay or station. Powdered or pea quality 7s. 6d. per ton extra. Light Soda Ash £7 ex quay, min. 4-ton lots with reductions for contracts.
 SODIUM CHLORATE.—£39 per ton.
 SODIUM CHROMATE.—4d. per lb. d/d U.K.
 SODIUM HYPOSULPHITE.—SCOTLAND: Large crystals English manufacture, £9 5s. per ton ex stations, min. 4-ton lots. Pea

crystals, £15 ex station, 4-ton lots. MANCHESTER: Commercial, £9 5s.; photographic, £15.
 SODIUM META SILICATE.—£16 per ton, d/d U.K. in cwt. bags.
 SODIUM NITRITE.—LONDON: Spot, £18 to £20 per ton d/d station in drums.
 SODIUM PERBORATE.—LONDON: 10d. per lb.
 SODIUM PHOSPHATE.—£12 10s. per ton.
 SODIUM PRUSSIAN.—LONDON: 5d. to 5½d. per lb. SCOTLAND: 5d. to 5½d. ex store. MANCHESTER: 4½d. to 5½d.
 SODIUM SILICATE.—140° Tw. Spot £8 per ton d/d station, returnable drums.
 SODIUM SULPHATE (GLAUBER SALTS).—£4 2s. 6d. per ton d/d. SCOTLAND: English material £3 15s.
 SODIUM SULPHATE (SALT CAKE).—Unground spot, £3 15s. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 5s.
 SODIUM SULPHIDE.—Solid 60/62% Spot, £10 15s. per ton d/d in drums; crystals, 30/32%, £8 per ton d/d in casks. SCOTLAND: For home consumption, Solid 60/62%, £10 5s.; broken 60/62%, £11 5s.; crystals, 30/32%, £8 2s. 6d. d/d buyer's works on contract, min. 4-ton lots. Spot solid 5s. per ton extra. Crystals, 2s. 6d. per ton extra. MANCHESTER: Concentrated solid, 60/62%, £11; commercial, £8.
 SODIUM SULPHITE.—Pea crystals spot, £13 10s. per ton d/d station in kegs. Commercial spot, £9 10s. d/d station in bags.
 SULPHATE OF COPPER.—MANCHESTER: £14 10s. per ton f.o.b.
 SULPHUR.—£10 15s. per ton. SCOTLAND: Flowers, £11; roll, £10 10s.; rock, £9; ground American, £10 ex store.
 SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quality.
 SULPHUR PRECIP.—B.P. £55 to £60 per ton according to quantity. Commercial, £50 to £55.
 VERMILION.—Pale or deep, 3s. 11d. to 4s. 1d. per lb.
 ZINC CHLORIDE.—SCOTLAND: British material, 98%, £18 10s. per ton f.o.b. U.K. ports.
 ZINC SULPHATE.—LONDON AND SCOTLAND: £12 per ton.
 ZINC SULPHIDE.—11d. to 1s. per lb.

Coal Tar Products

ACID, CARBOLIC.—Crystals, 8½d. to 9d. per lb.; crude, 60's, 2s. 11d. to 2s. 2½d. per gal. MANCHESTER: Crystals, 7½d. to 8d. per lb.; crude, 2s. 1d. per gal. SCOTLAND: 60's, 2s. 6d. to 2s. 7d.
 ACID, CRESYLIC.—90/100%, 1s. 8d. to 2s. 3d. per gal.; pale, 98%, 1s. 6d. to 1s. 7d.; according to specification. LONDON: 98/100%, 1s. 3d.; dark, 95/97%, 11d. SCOTLAND: Pale, 99/100%, 1s. 3d. to 1s. 4d.; dark, 97/99%, 1s. to 1s. 1d.; high boiling acid, 2s. 6d. to 3s.
 ANTHRACENE OIL.—Strained, 4½d. per gal.
 BENZOL.—At works, crude, 9d. to 9½d. per gal.; standard motor, 1s. 3½d. to 1s. 4d.; 90%, 1s. 4d. to 1s. 4½d.; pure, 1s. 7½d. to 1s. 8d. LONDON: Motor, 1s. 6½d. SCOTLAND: Motor, 1s. 6½d.
 CREOSOTE.—B.S.I. Specification standard, 3½d. to 4d. per gal. f.o.r. Home, 3½d. d/d. LONDON: 3d. f.o.r. North; 4d. LONDON. MANCHESTER: 3½d. to 4½d. SCOTLAND: Specification oils, 4d.; washed oil, 4½d. to 4½d.; light, 4½d.; heavy, 4½d. to 4½d.
 NAPHTHA.—Solvent, 90/160%, 1s. 6d. to 1s. 7d. per gal.; 95/160%, 1s. 7d. to 1s. 8d.; 99/100%, 11d. to 1s. 1d. LONDON: Solvent, 1s. 3½d. to 1s. 4d.; heavy, 11d. to 1s. 0½d. f.o.r. SCOTLAND: 90/160%, 1s. 3d. to 1s. 3½d.; 90/190%, 11d. to 1s. 2d.
 NAPHTHALENE.—Purified crystals, £9 15s. per ton in bags. LONDON: Fire lighter quality, £3 to £3 10s.; 74/76 quality, £4 to £4 10s.; 76/78 quality, £5 10s. to £6. SCOTLAND: 40s. to 50s.; whizzed, 70s. to 75s.
 PITCH.—LONDON: £2 19s. to £3 1s. per ton f.o.b. East Coast port for next season's delivery.
 PYRIDINE.—90/140, 6s. 6d. to 7s. per gal.
 TOLUOL.—90%. 2s. 3d. per gal.; pure, 2s. 6d.
 XYLOL.—Commercial, 2s. 2d. per gal.; pure, 2s. 4d.

Latest Oil Prices

LONDON, June 13.—LINSEED OIL was firmer. Spot, £23 15s. (small quantities, 30s. extra); June, £22 5s.; July-Aug., £22 10s.; Sept.-Dec. and Jan.-April, £23, naked. RAPE OIL was inactive. Crude, extracted, £28; technical refined, £29 10s., naked, ex wharf. COTTON OIL was quiet. Egyptian crude, £13 10s.; refined common edible, £16 10s.; and deodorised, £18, naked, ex mill (small lots, 30s. extra). TURPENTINE was steady. American, spot, 44s. 6d. per cwt.
 HULL.—LINSEED OIL.—Spot, quoted £22 17s. 6d. per ton; June, £22 10s.; July-Aug., £22 15s.; Sept.-Dec. and Jan.-April, £23, naked. COTTON OIL.—Egyptian, crude, spot, £13 15s.; edible, refined, spot, £15 15s.; technical, spot, £15 15s.; deodorised, £17 15s., naked. PALM KERNEL OIL.—Crude, f.m.q., spot, £14, naked. GROUNDNUT OIL.—Extracted, spot, £19 10s.; deodorised, £23 10s. RAPE OIL.—Extracted, spot, £27; refined, £28 10s. SOYA OIL.—Extracted, spot, £15 10s.; deodorised, £18 10s. per ton. COD OIL, 25s. per cwt. CASTOR OIL.—Pharmaceutical, 35s. 6d.; first, 30s. 6d.; second, 27s. 6d. per cwt. TURPENTINE, American, spot, 46s. 6d. per cwt.

From Week to Week

MR. ROBERT STEVEN RUSSELL, of the British Oxygen Co., 109 Headcorn Road, Thornton Heath, Surrey, died on May 29.

MR. JAMES DUNNACHIE, J.P., late chairman and managing director of the Glenboig Union Fireclay Company, Ltd., died on June 4.

COMPLAINT WAS MADE at a meeting of the Warrington Town Council that thousands of fish were being poisoned through copperas in the Appleton reservoir. The reservoir is owned by the Corporation.

MR. A. R. CHISHOLM has been appointed assistant manager at Doggart and Dye Works, Dalry. Mr. Chisholm had a four years' course in the Technical College, Glasgow, and a similar period of training at Irvine Bank Dye Works laboratory.

THE MINUTES OF EVIDENCE taken before the Departmental Committee on the Law and Practice relating to trade marks were published on June 15, and copies are obtainable from H.M. Stationery Office, Kingsway, W.C.2, or through any bookseller, price £1 2s. 6d. net.

MR. ANDREW GAW, of Nobel's Explosive Factory, Stevenson, died last week at his home in Stanley Road, Saltcoats. He had 42 years' service in Nobel's factory, and for 30 years was foreman in the acid sheds. He was the holder of three awards for long service.

THE DETERMINATION OF SMALL AMOUNTS OF COPPER in rocks was the subject of a paper read by Dr. A. W. Groves, at a meeting of the Mineralogical Society on June 7. The paper described the application to silicate analysis of the sodium diethyl-dithiocarbamate colorimetric method for copper. Data on the retention of copper by the ammonia precipitate were given. The method has a range of about 0.001 per cent. to 0.25 per cent. CuO when a sample of 2 grams is used.

IN THE CHANCERY DIVISION on Wednesday, Mr. Justice Luxmoore, at the conclusion of the legal arguments, reserved his judgment in the appeal by the I. G. Co. and Orrs Zinc White, Ltd., from a decision of the Comptroller of Patents, granting McKechnie Bros., Ltd., a licence of right to manufacture lithopone on the ground that there had been an abuse of monopoly rights by the appellants. The facts of the case were reported in THE CHEMICAL AGE last week (page 498).

A RESOLUTION TO INCREASE THE CAPITAL from £500,000 to £544,000 by the creation of 5,000 10 per cent. cumulative preference and 780,000 ordinary 1s. shares, will be submitted to shareholders of "Sanitas" Trust, Ltd., at a meeting on July 5. The sum of £44,000, part of the company's undivided profits, is to be capitalised and applied in paying up in full these new shares, which will be distributed among shareholders. The net profit for the year to May 31, 1934, amounted to £57,852, against £57,227 in 1932-33.

CROSBY LOCKWOOD AND SON, LTD., announce that they have the following books in active preparation: "Rubber: Its Physical and Chemical Properties." By T. R. Dawson, M.Sc., F.I.C., and B. D. Porritt, M.Sc., F.I.C., F.R.S.E. (prepared under the joint supervision of the Rubber Producers' Research Association and the Research Association of the British Rubber Manufacturers); "Piles and Pile Driving." By A. C. Dean, M.C., M.Sc., M.Inst.C.E., M.Inst.M.E., etc.; "The Theory of Vibrations For Engineers." By E. B. Cole, M.Sc. (Bristol), A.M.I.A.E., Lecturer in Mechanical Engineering at the University of Liverpool (an intermediate course); "Medico-Electrics." By Harold H. U. Cross, Ph.D., E.E., Electro Radiology Certificate, Faculty of Medicine, University of Paris (a treatise on the more important applications of electrical energy to medicine); and "Symbols for Designers." By Arnold Whittick (a handbook on the applications of symbols and symbolism to design in stone, granite, marble, wood, metal, etc.).

THE MINISTRY OF HEALTH has repeated its warning that antimony poisoning may be caused by the use of cheap enamel. A report just issued states that the substance normally used as an opacifier in enamelled holloware is tin oxide. In recent years this has been to some extent replaced by oxides of antimony, which are much cheaper than tin. Antimony tri-oxide dissolves in tartaric acid and other organic acids. The solution is a violent emetic and in certain circumstances may cause death. When soft enamels containing antimony are brought into contact with lemonade, whether artificial or made from fresh lemons, a similar solution may be produced, and severe outbreaks of poisoning have been caused in this way. The use of antimony in holloware might be brought under control by the marking or labelling of enamelled goods containing antimony, applying a solubility test, or allowing only the pentoxide or its compounds to be used. It is doubtful whether these measures would be entirely effective, and it is suggested that total prohibition of antimony in holloware might be found to be in the best interests both of the public and of the trade.

MR. C. G. EASTON, sales manager of Foamite Firefoam, Ltd., has been made a director of that company.

THE BRITISH OXYGEN CO., LTD., on and after July 2, will have its registered address at Victoria Station House, S.W.1.

THE TELEGRAPHIC ADDRESS of Thomas Hill-Jones, Ltd., manufacturing chemists, of Invicta Works, Bow Common Lane, London, E.3, has been changed to "Hill-Jones, Bochurch, London."

THIRTEEN CENTRIFUGAL EXTRACTORS, arranged as a self-balancing unit, have been built by a Japanese manufacturer for use in the Japanese sugar industry. All parts in contact with the products are of Monel metal.

MR. M. G. B. WHELPLEY, president of the Compania Saliterra Anglo Chilean and the Lautaro Nitrate Co., will shortly commence negotiations in London with British bond-holders. Senor Enrique Villegas, in charge of nitrate sales in England and continental markets and Senor Manuel Antonio Maira, an official representative of the Chilean Nitrate and Iodine Sales Corporation will also take part in the discussions.

APPLICATIONS FOR LICENCES under the Dyestuffs (Import Regulation) Acts, 1920 to 1934, during May totalled 794, of which 723 were from merchants or importers. The Dyestuffs Advisory Licensing Committee granted 783 licences and referred nine applications to British makers of similar products, leaving two cases outstanding on May 31. Of the total of 794 applications received, 791, or 99.6 per cent., were dealt with within seven days of receipt.

DR. LESLIE BURGIN, Parliamentary Secretary to the Board of Trade, spoke on "The part to be played by iron and steel in trade recovery" at the first of a series of luncheons given by the London Iron and Steel Exchange, on June 12. In Dr. Burgin's view the long-term prospects of the industry were good. More and more capital goods manufactured from iron and steel were being and would be required. He concluded with a suggestion that the railway lines of the country might be utilised as the tracks for the conveyance of other forms of public utility, instead of being confined to transport of goods and passengers, and instanced electric cables encased in steel tubes.

THE IMPORT DUTIES ADVISORY COMMITTEE has received applications for an increase in the import duty on sodium nitrite. It has also under consideration applications for the addition to the free list of dextrine, farina (or potato starch), wheaten starch, cassava (or tapioca) root, flour and starch (excluding the foodstuff tapioca), copal gums (including animi and elemi copal gums, demerara, para and locust gums), damar gums, and kauri gums, and for the reduction of the import duty on shrimps in brine. Representations should be addressed in writing to the Secretary, Import Duties Advisory Committee, Caxton House (West Block), Tothill Street, Westminster, London, S.W.1, not later than July 7.

OVER A HUNDRED AND FIFTY EMPLOYEES of the Vacuum Oil Co. have been with the company for twenty years or over. Most of their photographs adorn one of the corridors at Caxton House, known as the "Long Service Gallery." Not all the old stagers—the oldest of them has 45 years' to his credit—appear in the picture gallery; some of them are too modest to have their photographs taken. But their absence is made up by the presence of a number of servants of the company who have since retired, and there are now 171 photographs on the walls. Four members of the staff have over 40 years' service, thirty-two others have over 30 years' service, and the remainder range down from 29 years to 20 years. The total number of years service represented on the walls of the gallery is 4,118.

THE FEDERATION OF BRITISH INDUSTRIES, at a meeting of the Executive Committee on June 12, considered the question of Anglo-Spanish trade relations, and came to a unanimous decision that H.M. Government should be urged to enter into immediate negotiations with the Spanish Government for a new treaty. In a letter dispatched to the President of the Board of Trade the Federation points out that this country has had a consistently adverse trade balance of £7,000,000 annually for the past five years from its trade with Spain. Allowing for invisible exports, this adverse balance must be at least £3,500,000 per annum. The Federation points out that the Spanish duties are some of the highest in the world and that quite a number of member industries who formerly did good business with Spain have now either abandoned any attempt to get over the Spanish tariff wall, or have been forced into setting up local factories in Spain. The Federation, while appreciating the fact that negotiations cannot take place with all countries simultaneously, points out that Spain represents a considerably larger potential market for our goods than many other countries, and that a great number of British manufacturers attach great importance to the taking of immediate steps to secure more favourable treatment for our goods entering Spain.

AMONG SEVERAL PAMPHLETS issued by the Development Committee to advertise Manchester there is one concerned with industrial processes under the general description of "plastics." Manchester has special facilities for factories engaged in this sort of work. It maintains 35 miles of water-pipes which deliver water at a pressure of 1,000 lb. per sq. in. to hydraulic presses. Fifty firms interested in the plastics industry are established in the city.

Company News

British Oxygen Co.—A half-yearly dividend is announced on the $6\frac{1}{2}$ per cent. preference stock.

Timothy Whites.—An interim payment of 5 per cent., less tax, is announced on the deferred ordinary shares, payable on June 16.

Ipswich Beet Sugar Factory.—Reduced profits are announced for the year to March 31 last, the net balance of £24,844 comparing with £38,386. The ordinary dividend is repeated at 6 per cent., tax free, and the reserve transfer reduced from £14,386 to £844.

Ely Beet Sugar Factory.—A net profit of £93,515 is reported for the year to March 31 last, compared with the previous level of £90,971. The ordinary dividend is raised from 10 per cent., to 12½ per cent., tax free, and the reserve transfer is £37,265 compared with £45,971 a year ago.

Bradford Dyers' Association, Ltd.—The directors have decided to defer payment of the dividend for the six months ending June 30 on the 5 per cent. cumulative preference stock. Interest on the 4 per cent. debenture stock will be paid, as usual, on July 2. The preference dividend is paid to December 31, 1932.

International Nickel Co.—A quarterly dividend of 7 per cent. per annum on par value of preferred stock is announced, payable on August 1, by Morgan Grenfell & Co., as disbursing agents on shares on London register in sterling at the cable rate of exchange on New York obtaining in London at the opening of business on August 1.

Home Grown Sugar, Ltd.—After returning losses for two years, the company reports a net profit of £7,275, and the directors recommend an ordinary dividend of 5 per cent. less tax, the first distribution since 1931. The working arrangement with the English Corporation expired on March 31, but has been extended for one year.

A. Boake Roberts & Co.—The trading profit has increased from £70,542, for the year ended March 31, 1933, to £89,176. The dividend is increased from $8\frac{1}{2}$ per cent., free of tax, to 10 per cent., free of tax, allowing the allocation of £10,000 (against £8,475) to reserve and a substantial addition to the carry-forward, which rises from £53,157 to £76,851.

J. C. & J. Field.—The report for the year ended March 31, 1934, states that, after providing for repairs and depreciation, tax, fees, legal charges, etc., the profit was £19,019, against £18,835 to which is added £9,751 brought forward, making £28,770. The board recommends a dividend of 10 per cent. and bonus of $2\frac{1}{2}$ per cent. on the ordinary shares less tax, writing off goodwill £6,553, carrying forward £9,389.

King's Lynn Beet Sugar Factory.—For the year to March 31 last a net profit of £47,699 is reported compared with £52,025 in the previous year. General reserve receives £20,699, and the ordinary dividend is doubled at 6 per cent. tax free. For the previous period a debit of £14,659 brought forward was eliminated, and £23,866 was put to general reserve.

Forster's Glass Co.—The accounts for the year ended March 31, 1934, show a trading profit, after depreciation, at £57,357, against £44,930 in 1932-33. The directors' fees, bank and other interest, debenture interest and tax take £16,729; and directors recommend a dividend of 5 per cent. per annum, less tax on the ordinary shares, together with cash bonus of 2 per cent., that £20,000 be transferred to reserve, and that £10,195 be carried forward.

Zinc Corporation.—A participating dividend of 9d. per share has been declared on both preference and ordinary shares, making a total participating dividend of 1s. 3d. per share in respect of 1933. The participating payment on the £1 preference shares for 1933—in addition to the cumulative dividend of 20 per cent.—is thus $6\frac{1}{2}$ per cent., against $2\frac{1}{2}$ per cent. for the previous period; the ordinary 10s. shares receive $12\frac{1}{2}$ per cent., compared with 5 per cent. a year ago. The distributions and the usual half-yearly preference payment will be paid on July 2, less tax.

English Beet Sugar Corporation.—The report for the 12 months ended March 31 last states that the total amount paid to growers was £627,193, against £596,517 in 1932-33, and again included a sum for additional sugar content. The corporation again operated the Kelham factory of Home Grown Sugar, Ltd., and received a proportionate profit balance of £11,149, against a debit balance of £11,412 in the previous period. The net profit is up from £74,627 to £110,598. The ordinary dividend is raised from 10 per cent. to 15 per cent., tax free, and the reserve transfer from £24,626 to £35,598.

WITHIN SEVEN DAYS of the issue by the Department of Overseas Trade of forms of application for space at next February's British Industries Fair, seven manufacturers of chemicals had applied for 1,600 sq. ft. of space. The demand for space is almost twice as great as it was at the corresponding date last year. In all, 181 manufacturers have applied for 75,320 sq. ft. compared with 96 applications for 43,205 sq. ft. last year.

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

British India.—H.M. Trade Commissioner at Calcutta reports that the Indian Stores Department, Simla, is calling for tenders, to be presented in Simla by July 3, 1934, for the supply of salt glazed ware pipes and fittings. (Ref. B.Y. 7824.)

Canada.—A firm of manufacturers' agents in Vancouver desires to obtain the representation of United Kingdom manufacturers of drugs and Allied lines in British Columbia and Alberta, on a commission or consignment basis. (Ref. No. 586.)

South Africa.—H.M. Trade Commissioner at Johannesburg reports that the City of Johannesburg (Electricity Department) is calling for tenders, to be presented in Johannesburg by July 16, 1934, for the supply, delivery and erection at the Council Power Station of three cooling towers built with internal launders, filling and all necessary accessories, excavations, foundations, ponds and canal. (Ref. G.Y. 13902.)

South Africa.—H.M. Senior Trade Commissioner in South Africa reports that the South African Railways and Harbours Administration is calling for tenders (Tender No. 310), to be presented in South Africa by July 30, 1934, for the supply of 15,780 gallons of raw linseed oil and 33,900 gallons of boiled linseed oil. (Ref. B.Y. 7627.)

South Africa.—H.M. Trade Commissioner at Johannesburg reports that the South African Railways and Harbours Administration is calling for tenders (Tender No. 303), to be presented in South Africa by July 30, 1934, for the supply of approximately 18,140 gallons of varnishes and 4,880 gallons of enamels. (Ref. B.Y. 7822.)

Austria.—A firm established at Vienna wishes to obtain the representation, on a commission basis, of United Kingdom manufacturers of high duty aluminium alloys. (Ref. No. 593.)

Morocco (French Zone).—A dealer at Casablanca desires to obtain the agencies of United Kingdom suppliers of chemical manures, sulphur and other chemical products. (Ref. No. 621.)

Books Received

Organic Chemistry or Chemistry of the Carbon Compounds. By Victor von Richter. Vol. 1. The Aliphatic Series. Revised by Eric Newmarch Allot. London: Kegan Paul, Trench, Trubner & Co., Ltd. Pp. 790. 35s.

Official Chemical Appointments. London: The Institute of Chemistry. Pp. 389.

The Chemical Manufacturers' Directory, for 1934. London: Simpkin Marshall, Ltd. Pp. 197. 4s. 6d.

A Laboratory Book of Elementary Organic Chemistry. By Alexander Lowy and Wilmer E. Baldwin. London: Chapman & Hall, Ltd. Pp. 182. 15s. 6d.

Uncle Joe's Nonsense for Young and Old Children. By J. W. Mellor. London: Longmans, Green & Co. Pp. 231. 12s. 6d.

Traite de La Couleur. By M. A. Rosenstiehl. Paris: Dunod. Pp. 248.

Official Publications

The Industrial Application of X-Ray Crystal Analysis. London: H.M. Stationery Office. Pp. 16.

A Five Year Bibliography of the Theory of Refrigeration, Refrigerants and Appliances, 1929-1933. Compiled by H. T. Pledge. London: H.M. Stationery Office. Pp. 97. 2s.

Bulletin of the Imperial Institute. Vol. XXXII. No. 1. 1934. London: John Murray. Pp. 194. 3s. 9d.

New Companies Registered

F. D. Howell, Ltd.—Registered June 9. Nominal capital £1,600. Retail and wholesale chemists and druggists, analytical and consulting chemists, chemical engineers, etc. A subscriber: Frank Wilders, 78 Wilton Road, Muswell Hill, London, N.10.

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